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PSYCHE

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TRICHOPTERA FROM THE FIJI ISLANDS

By Nathan Banks

From the Fiji Islands Brauer in 1867 described three species of caddice flies, *Wormaldia nervosa*, *Hydromanicus ruficeps*, and *Hydromanicus piceus*. In 1924 I added three more from material collected by W. M. Mann in 1915, *Goera fijiana*, *Chimarrha manni*, and *Chimarrha obscurella*. In 1934 Mosely described two more, *Triænodes dubia* and *Hydropsychodes fijiana;* he also places the two Hydromanicus of Brauer in the genus Hydropsychodes.

From additional material collected by Mr. Mann (part of which was alcoholic) I am adding seven more, making a total of fifteen species, placed in nine genera and four families.

SERICOSTOMATIDÆ

Gœra fijiana Bks.

Besides the type there are specimens from Wainganitu and Mt. Victoria, Viti Levu.

CALAMOCERATIDÆ

Anisocentropus fijianus sp. nov.

Yellowish, antennæ, palpi, and legs pale yellowish, darker on vertex and thoracic notum; fore wings yellowish, with fine short black hairs, but otherwise rubbed; stigmal area opaque whitish, from behind this is a curved brownish band with irregular edges, extending to hind margin crossing the middle of the discal and the apical half of the median cell, in certain lights it shows a purplish sheen; hind wings nearly hyaline, with gray hair and fringe.

Fore wings short and broad, nearly as broad as *A. flavicaput*, discal cell only about two-thirds of its pedicel and hardly longer than second apical cell, fork one back on discal cell hardly width of cell, fork two back on discal cell a little, fork three back on median cell a little, fork four also back on median cell hardly width of cell. Venation of hind wing much like *A. flavicaput*, except that the cross-vein from medius to fork five is not oblique.

Male genitalia largely covered from above by a broad membraneous plate with emarginate sides, through the emargination projects a slender clavate bristly appendage, there is a slender pointed median piece above this plate. From side is seen a moderately slender lateral appendage, very hairy, especially below; a smooth median piece (also seen from above) projects below the tip of lateral appendage, two slender hairy ventral pieces.

Fore wing 7 mm. long.

From Wainunu, Fiji Islands (W. M. Mann). Type M.C.Z. No. 22041.

LEPTOCERIDÆ

Notanatolica pallida sp. nov.

Yellowish, vertex and thoracic notum more brown; antennæ pale, with narrow brown annulations; palpi yellowish, with gray hair; legs pale yellowish, front tarsi more brown. Fore wings pale, stigmal area rather dark and back across the anastomosis, two brown streaks at base, one costal, the other between anal veins; hind wings pale and with yellowish veins.

In fore wings the discal cell is hardly one half as long as its pedicel; fork one equals discal cell and has a pedicel two thirds its length, fork three does not quite reach to the cross-vein; the cross-vein from sector to radius is about its length before end of discal cell, the cross-vein from sector to medius also about its length before end of discal cell, cross-vein from medius to cubital fork a little beyond it; hind wings with no fork one; cross-vein from sector to medius about twice its length before end of discal cell, fork three reaches back about opposite end of discal cell, pedicel one third its length.

Male genitalia show above a triangular plate at base, a pair of bristly appendages with sub-parallel sides, and below there is a smooth piece with bilobed tip; the lateral appendages are rather broad on basal part, smooth, and with a few long bristles toward tip and below, the apical part more slender and hairy, beneath it projects the hooked tip of a spur from the inner basal part.

Fore wing 13 mm. long.

From Wainganitu, Fiji Islands (W. M. Mann). Type M.C.Z. No. 22042.

Triænodes dubia Mosely

A rubbed female, 7 mm. long fore wing, agrees very well with the figure of venation; a short fork one, long discal cell, irregular elongate hyaline white mark over much of the anastomosis. From Wainganitu, Fiji.

Triænodes manni sp. nov.

Yellowish, abdomen slightly brownish, antennæ with narrow ring of brown at apex of each joint. Fore wings yellowish, darker over stigmal region and back broadly over anastomosis, the anastomosis itself being mostly white, some dark along veins toward base of wing, a dark spot at base of fork one and on other veins behind this, and beyond a more or less definite dark band across wing, a larger spot near end of cubitus; in female much of the apical area is brownish, and also most of the basal half of wing, the anastomosis, however, remains white.

In fore wing fork one is much longer than the pedicel, the discoidal cell longer than its pedicel, third apical vein ends a little before tip of wing, no trace of stub to fifth apical vein, but in the field behind the discoidal cell there is a short longitudinal faint line or vein, possibly a remnant of the medius. The genitalia are much on the plan of *T. bœttcheri* Ulmer from the Philippines; the slender superior median piece with the longer slender lateral pieces (both more elongate than in *T. bœttcheri*), the long slender spine-like processes reaching beyond the lower appendages, and with a slightly out-curved tip; the long median piece is curved down over the end of the lower appendages, and from side as well as above the tip is broad and rounded (pointed in *T. bœttcheri*) ; the lower appendages are long, with blunt, broad tips (narrowed in *T. bœttcheri*) and from below each is seen to be bilobed at tip, each has above (as in *T. bœttcheri*) a slender curved process from the base.

Length of fore wing 6.5 mm.

From Wainganitu, Fiji Islands (W. M. Mann).

Type M.C.Z. No. 22043.

Œcetinella pulchella sp. nov.

Pale yellowish, vertex and a broad median stripe on thoracic notum brown; antennæ, palpi, and legs pale. Fore wings tinted with brown on most of the apical half, and behind; in basal part with a broad brown band with irregular edges across over the bases of median and discal cells, and an elongate brown spot before this between the radial sector and the medius; stigmal region opaque, whitish, with a brown mark near base, and another near tip; these tend to form bands since the veins behind them are more darkly bordered than the general surface; each apical vein has a dark brown mark at tip, and also at end of anal veins; in some places there are hyaline spots in the brown, mostly along veins in the basal part; hind wings hyaline. The venation is extremely similar to *Œ. confluens*, except that the cross-vein from fork of radial sector to fork of the medius is beyond the end of discal cell (before in *confluens*), the discal cell is longer than in *confluens*, extending back almost as far as median cell (much shorter than median cell in *confluens*), fork one extends a little further back on discal cell, and the end of the median cell is more oblique than in *confluens*.

The male genitalia show above three slender, hairy pieces, the lateral ones the broader, and just below is a long-forked smooth process. From the side the lower appendages of the only male are not the same; on right side is a long curved piece, rather broad throughout, but entire at tip, on the left side is a piece which is broadened and forked at tip, the upper fork long, slender and curving upward.

Fore wings 5 mm. long.

From Wainganitu, Fiji Islands (W. M. Mann).

Type M.C.Z. No. 22044.

HYDROPSYCHIDÆ

Hydropsychodes fijiana Mosely

Many specimens from Wainganitu, Fiji Islands (W. M. Mann).

Hydropsychodes ruficeps Brauer

Three females from Wainganitu, Fiji (W. M. Mann). In this species the subapical spot is further from the outer margin than in *H. fijiana,* and the submedian spot occupies most of the discal cell (in *H. fijiana* just before this cell); the cross-vein from first anal vein to cubitus is more basally placed than in *fijiana* and is very oblique, and just before it is a small patch of white hair (not shown by Brauer). The dark band above antennæ is broader than indicated by Brauer; the fork two goes back on discal cell further than fork one, but hardly as far as in *H. fijiana;* in the maxillary palpi the joints two and three are about equal, and four plainly shorter.

Hydropsychodes piceus Brauer

One female from Wainganitu, Fiji Islands (W. M. Mann) agrees fairly well with Brauer's description; it is a little larger, fore wing nearly 7 mm. long; the discal cell is much smaller than in *H. fijiana,* and fork two is scarcely a bit further back on discal cell than fork one; the cross-vein from first anal vein to cubitus is much more basally placed than in *H. fijiana,* and is scarcely oblique, fork three is longer than in *fijiana* and very slender. In hind wings fork two goes back on discal cell two thirds the length of cell, and fork three is longer than in *fijiana;* the maxillary palpi have joints two, three, and four subequal in length, but four is more slender.

Polyplectropus manni sp. nov.

Head yellowish, vertex scarcely darker, the warts yellow; palpi and antennæ yellowish; pronotum yellowish, mesonotum brownish, rather darker on the sides; abdomen pale brown above, venter paler; legs yellowish, spurs scarcely darker. Fore wings pale yellowish brown, with a long dark streak over stigmal area to the tip; hind wings rather gray, with scattered black hairs.

In the fore wing the discal cell is over three times as long as broad at tip, fork one shorter than its pedicel, fork two sessile on discal cell, fork three longer than its pedicel, fork four nearly back to end of median cell, fork five back to slightly before the end of anal veins; in hind wings fork one is very short, fork two back almost to cross-vein, fork five back to the cross-vein.

Male genitalia show a slender median superior piece, with a spine at each apical corner, the lateral appendages are broad at base, tapering, somewhat abruptly above near middle, and at tip with a slender, apparently flexible, sinuous part, this appendage is very bristly; the lower appendages are somewhat shorter, broad and heavy, with rounded tips, from below they are divergent; between is a short, slender penis with enlarged tip.

Fore wings ♂ 4.6 mm., ♀ 7 mm.

From Wainganitu, Fiji Islands (W. M. Mann). Type M.C.Z. No. 22045.

Polyplectropus fijianus sp. nov.

Head yellowish, vertex scarcely darker; palpi and antennæ pale yellowish, latter rather heavy; pronotum pale yellowish, mesonotum reddish brown, except lobes in front of the wings which are yellow; abdomen dark brown, genitalia pale; legs (including spurs) pale yellowish.

Fore wing yellowish brown, costal and especially the stigmal region much darker; hind wings nearly hyaline. In the fore wings the discal cell is nearly three times as long as broad at tip, fork one with moderately long pedicel, fork two back a little on discal cell, fork three with a long pedicel, fork four reaching only a little basally of fork three, fork five almost back to mediocubital cross-vein.

Genitalia with a slender superior median appendage, seen from side the tip upcurved; lateral appendages with a superior subbasal process and a sharp curved tip; inferior appendages long and thick, on the upper edge a little beyond middle is a long curved hook or tooth.

Fore wings ♂ 5 mm.

From Mt. Victoria, Viti Levu, Fiji Islands (W. M. Mann).
Type M.C.Z. No. 22046.

Chimarrha signata sp. nov.

Head pale, a large triangular black spot between ocelli; palpi pale brown; antennæ dull yellowish; pronotum pale; mesonotum brown, except the yellow scutellum; legs dull yellowish, spurs brown.

Fore wings brown, uniform, except for a large hyaline-white spot in middle, over the discal and median cells and the space between them; hind wings brown in apical and costal parts, elsewhere nearly hyaline. Fore wings with discal cell hardly twice as long as broad, the radial sector just before it slightly curved, and the radius above the discal cell is also a little curved; forks one and two sessile on discal cell, fork three very much shorter than pedicel, fork five opposite base of discal cell. In hind wings fork one is extremely short, fork two back to discal cell, fork three also extremely short.

Male genitalia show the lower appendages swollen near middle on outer side, the apical part small, pointed, and very hairy; from above the lower appendages show a subbasal projection tipped by stiff bristles, between these processes are two long slender dark rods.

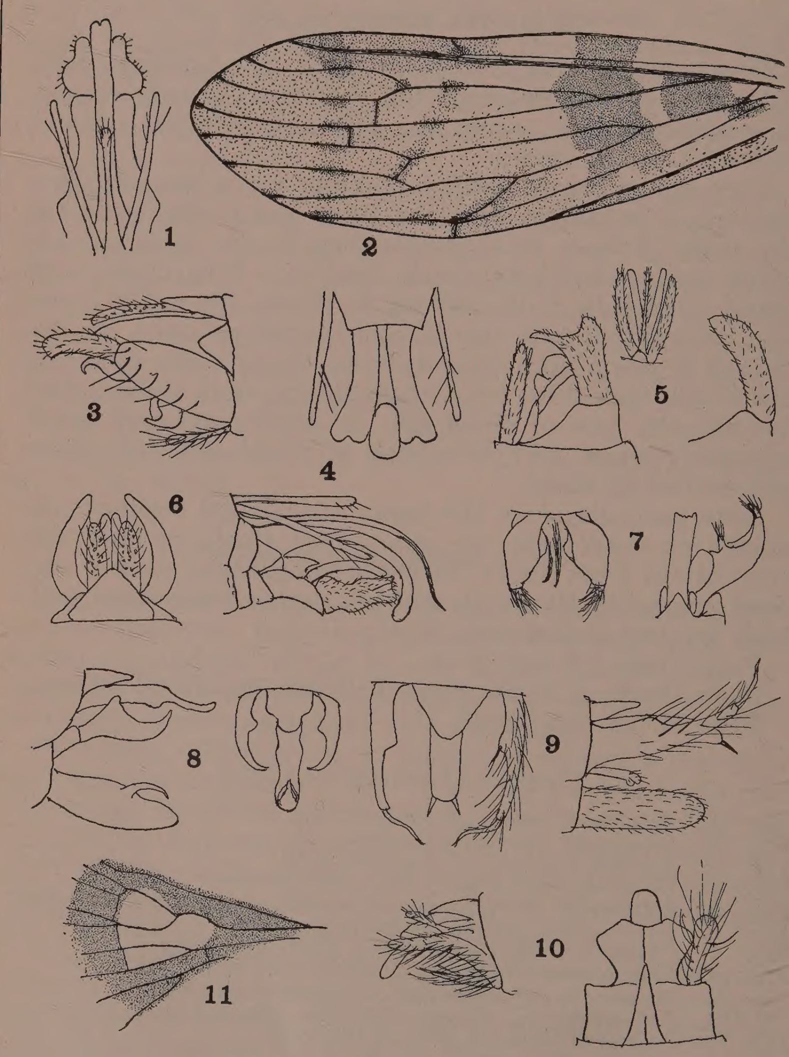
Fore wings 4.3 mm. long.

From Taviuni, Somo Somo, Fiji Islands (W. M. Mann).
Type M.C.Z. No. 22047.

EXPLANATION OF PLATE 2

Fig. 1. *Triænodes manni*, genitalia, above.
Fig. 2. *Oecetinella pulchella*, forewing.
Fig. 3. *Notanotolica pallida*, genitalia, side.
Fig. 4. *Triænodes manni*, genitalia, side and below.
Fig. 5. *Oecetinella pulchella*, genitalia, side, above, and left clasper.
Fig. 6. *Notanotolica pallida*, genitalia, above.
Fig. 7. *Chimarrha signata*, genitalia, above and below.
Fig. 8. *Polyplectropus fijianus*, genitalia, side and above.
Fig. 9. *Polyplectropus manni*, genitalia, above and side.
Fig. 10. *Anisocentropus fijianus*, genitalia, side and above.
Fig. 11. *Chimarrha signata*, part of forewing.

Psyche, 1936 VOL. 43, PLATE II.



Banks — Trichoptera from Fiji Islands.

THE TOXICITY OF TRIMETHYLAMINE FOR *NECROPHORUS ORBICOLLIS* (SAY).

By Cyril E. Abbott

Morgan Park, Ill.

As a natural decomposition product of flesh, trimethylamine [$N(CH_3)_3$], is found, in varying concentrations, in those animal remains to which various necrophilous beetles are attracted. It is of some interest to know, then, how well a species such as *Necrophorus orbicollis* can withstand the toxic effects of this chemical.

For testing the resistance of the beetle to various concentrations of the substance a glass jar with a hollow, ground-glass stopper was used. The jar had a capacity of 125 cc.; the hollow in the stopper 5 cc. The stopper was stuffed tightly with cotton, which was then soaked with all the solution it would contain without dripping. The jar was cleaned with hot water, the stopper replaced, and the whole allowed to stand for 1 minute before the specimen was introduced. The beetle was thus exposed to the chemical in its gaseous form.

The insects used were active adults, and, although but one specimen was used at a time, each experiment was repeated with two additional beetles, so that an average could be determined; this was necessary because individuals varied in size. The data on any specimen showing an unusually long or short period, as compared with the other two specimens, was discarded; the average then being taken from the two remaining.

It is somewhat difficult to determine the exact death-point for the Necrophori. Preliminary experiments indicated that although parts of the body may move for hours, beetles in which not more than one tarsus twitched spasmodically never recovered after removal from the jar; this was considered the "death-point," and the time elapsing between the introduction of the insect into the jar and this point constituted the time necessary to produce death.

The stock solution of trimethylamine had a concentration of 33%. It is doubtful if a greater concentration than this ever occurs in nature. Dilutions of the stock solution with water were used for the remaining tests.

By making a few progressive records of the action of the chemical on the beetles, paralysis was found to occur in the following order:

1. Paralysis of posterior legs.
2. Paralysis of middle legs.
3. Paralysis of anterior legs. (This followed so closely upon that of the middle legs that in concentrated atmospheres the time interval could not be determined.)
4. Paralysis of antennæ.
5. Paralysis of mouth-parts (practically all at once).
6. Spasmodic twitching of tarsi and tip of abdomen.
7. Slow movements of legs and head.
8. Movement of abdomen only. (May continue for many hours.)
9. All movement ceases.

The time durations necessary to bring about death at various concentrations of trimethylamine were as follows:

33% — 5 minutes
25% — 7 minutes
20% — 10 minutes
10% — 22 minutes
5% — 40 minutes
1% — 70 minutes

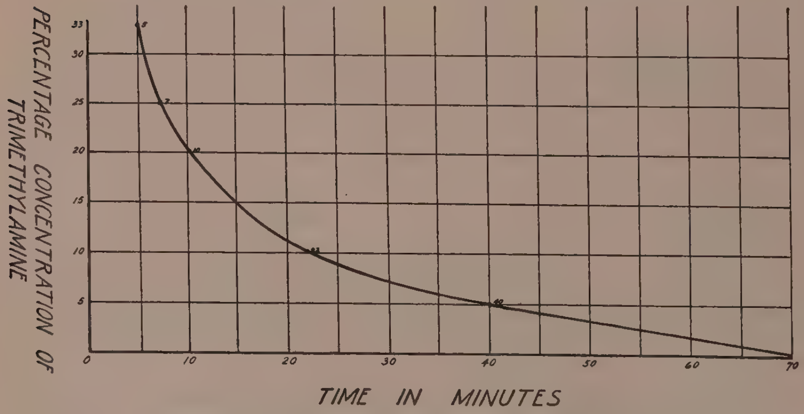


FIG. 1. Toxicity of trimethylamine for *Necrophorus orbicollis*.

The graph (Fig. 1) indicates a little more clearly the relation between toxicity and the various concentrations of the chemical. It appears that at high concentrations death occurs very rapidly, but that as the concentration decreases the toxicity becomes less. Moreover, the toxicity decreases, not in direct proportion to the concentration, but in a kind of geometric proportion. At very low concentrations (1%) the beetles can withstand the fumes for a long time.

The objection may be raised that the data here given do not represent the toxicity of given concentrations of substance, but the *time* required for the substance to reach a toxic concentration in an inclosed space. But this is chiefly an academic objection. If seventy minutes are required for a 1% solution of trimethylamine to fill 125 cc. of space with enough gas to kill a beetle, the result is practically the same as if a low concentration, held constant, brought about the same result. The effect is the same in either case.

There is some indication that, in low concentrations, trimethylamine actually attracts Necrophori. Several specimens kept in an experimental cage, were trapped twice as frequently with this as with pure water. Beetles also tore a piece of cotton soaked with the chemical and left in their cage.

Dead bodies lying in the open must be comparatively free from high concentrations of so volatile a substance as trimethylamine. In a confined space the situation is different. It is the custom of collectors to trap necrophilous beetles in jars sunk in the earth and containing scrap meat. In such jars Necrophori, as well as other beetles, are often found dead, even when the decaying flesh is not sufficiently liquified to produce drowning. Such jars have a strong odor of ammonia, which doubtless, in many cases, is due to the presence of trimethylamine.

A SINGULAR CREMATOGASTER FROM GUATEMALA

By William Morton Wheeler

Among a number of ants which I collected during the spring of 1935 in Guatemala one of the Crematogasters is so unusual that it merits special description. Two colonies of these insects were found while I was collecting with Dr. Marston Bates on March 19 (which happened to be my seventieth birthday) along the northern shore of the exquisitely beautiful Lake Atitlan. Each colony was nesting in the soil under a stone, one in an open sandy spot a quarter of a mile south of the hotel at Tsanjuyo, the other in a grassy meadow about a mile farther on, near the village of Panajachel. The approximately equal populations of both these colonies comprised males, females, workers and brood. The extraordinary appearance of the males, which were small, wingless, slow-moving creatures with conspicuous white thoraces and clung huddled together on the lower surface of the stone when they were not being carried about by the workers, led me to collect as many specimens as possible of the adults and brood of all the castes. It was the very height of the dry season, and further search in the two localities revealed no other colonies of this ant or indeed of other species, except a few colonies of the fire-ant (*Solenopsis geminata* Fabr.) and of certain common forms of Pseudomyrma and Camponotus, which were nesting in the dead branches of the trees and shrubs.

Comparison of specimens from the two Crematogaster colonies with other Neotropical species of the genus shows that the workers are so similar to those of *C.* (*Orthocrema*) *sumichrasti* Mayr that, apart from coloration, no important differences can be detected. The worker and female of the typical *sumichrasti* from Mexico are yellow, whereas the corresponding castes of the Atitlan form are dark brown or black. The male of the latter also differs from the male *sumichrasti* in having the thorax and pedicel ivory white, instead of yellow and the head and gaster more deeply infuscated, and both the male and the female are *completely apterous, even in the pupal stage*, instead of possessing well-developed wings like *sumichrasti*. Many years ago (1884), Forel described the worker and female (presumably winged or deälated) of a form of *sumichrasti* collected by Stoll at Antigua, Guatemala, as subsp. *surdior*. Two worker cotypes of this ant in my collection show that the body is pale reddish castaneous and hence intermediate in color between the typical *sumichrasti* and the form from Lake Atitlan. Yet the aptery of *both* sexual castes of the latter, a condition unique among all known Formicidæ, suggests two problems, one involving the interpretation of the constitution of the colony as a whole, the other purely taxonomic. In other words, we are led to inquire whether the personnel of each of the colonies which I collected consists of a single independent, or of two different species, living in host and parasite relation. Either a positive or a negative answer to this question necessarily implies the further question as to the taxonomic status of the Atitlan specimens.

That we are dealing with only a single form in each of the two colonies is indicated by the following considerations:—

(1) Apart from coloration, which can have only varietal significance, and the aptery of the two sexual castes, which to the taxonomist is a more important character, there is very little to distinguish the Atitlan form from *sumichrasti*.

(2) The darker color of the worker and female and the aptery of both sexual castes might be interpreted as mutations that have survived in a peculiar xerothermal environment. This is suggested by the fact that the colonies were nesting in the ground in exposed situations, whereas all or nearly all the other known species of the subgenus Orthocrema are forest ants which nest in plant-cavities. This is true even of the typical *sumichrasti* and its subsp. *surdior*. The type colony of the latter, according to Forel, was found attending aphids under the leaf-sheaths of a banana plant, and recently Dr. Skwarra (1934, p. 120) has recorded the

following sites in which she observed the typical *sumichrasti* nesting in various Mexican localities: in the trunk of a tree, in the stem-cavities of *Cecropia mexicana*, under the leaf-bases of bananas, in the stems of the Melastomaceous plant *Conostegia xalapensis*, in the pseudobulbs of the orchid *Schomburgkia tibicinis*, and most frequently between the overlapping leaves of Bromeliads, namely, *Aechmia mexicana* and the following species of Tillandsia: *Balbisiana, dasyliriifolia, pruinosa, streptophylla, Valenzuelana* and *viridifolia*. Forel (1908) records the typical *sumichrasti* as having been taken by Biolley at San Jose, Costa Rica (1160 m.) in decayed wood. The very different habitat of the Atitlan colonies might account for the deeper pigmentation of all three castes and, perhaps, for the aptery of the males and females. The physiological causes of aptery in insects, however, are apparently obscure and very diverse. To contend that the "genes for winged" have completely dropped out of the germ-cells of these ants would be merely, if a mixed metaphor may be permitted, to make a "Ruhekissen" out of a photograph of the problem.

It is more probable that each of the Atitlan colonies is a mixture of two species, one of which, comprising the apterous males and females, is an undescribed workerless parasite, the other an undescribed subspecies of *C. sumichrasti*, represented only by the workers and functioning as the host.

(1) In the field the depauperate appearance of the colonies and the peculiar males at once suggested this interpretation, because Crematogaster colonies containing young sexual individuals are, as a rule, very populous. According to Dr. Skwarra's observations, those of the typical *sumichrasti* even contain several mother queens, frequently as many as 16 to 20, and are probably of pleometrotic origin. She mentions one colony which comprised 31 deälated females and 962 workers, and another 164 deälated females and about 1200 workers. These are by no means unusually large colonies compared with those of many other species of Crematogaster. As shown in the following table, however, the combined populations of the two Atitlan colonies, including their brood, are very meager:

Workers (adult)	224
Workers (callow)	6
Workers (pupal)	1
Females (adult)	4
Females (callow)	17
Females (pupal)	21
Males (adult)	139
Males (pupal)	46
Larvæ and semipupæ (mostly or all males)	60
Total	518

Since the two colonies were of about the same size the workers in each averaged about 115 and were therefore only a ninth or a twelfth as numerous as in the two well-developed *sumichrasti* colonies observed by Dr. Skwarra.

(2) Closer scrutiny of the preceding table yields even firmer support for the contention that the wingless males and females are parasites, because in genera of workerless parasites, of which Wheeleriella and Anergates may be regarded as typical, the host queen is assassinated either by her own workers or by the intrusive queen and the brood of the host species is therefore lacking. It will be seen from the table that there were only one pupal and six callow workers in the two colonies. Of the 60 larvæ and semipupæ mentioned at the end of the list, the semipupæ, which numbered 36, are undoubtedly, and the 24 larvæ, which are too small to exhibit sexual characters, are very probably all or mostly males. Of the four adult females, three were taken from the colony near Panajachel, and one from the colony near Tsanjuyo. The latter, in all probability, is the original mother of all the larval, callow and adult sexual forms of that colony, but whether the other colony contained three mother queens or whether two of them were her mature daughters cannot be determined, owing to their equally deep pigmentation and complete aptery. Dr. Skwarra's observations on the pronounced pleometrotic proclivities of the typical *sumichrasti* suggest that all three queens may have been the mothers of the males, females and brood of the colony near Panajachel.

(3) The foregoing interpretation is supported also by the putative parasitism of several other species of Crematogaster. As early as 1910 I called attention to the species of the Ethiopian, Malagasy and Indomalayan subgenus Oxygyne, in which the females have peculiar falcate mandibles, as probably being temporary social parasites in the nests of other species of Crematogaster.[1] This statement would seem to apply also to two other Ethiopian subgenera, Atopogyne and Nematocrema. The females of the former have large rectangular heads and robust subfalcate mandibles, while the females of Nematocrema resemble those of Oxygyne. *Crematogaster acuta* Fabr., a rather common Neotropical species, which Emery regarded as the type of the subgenus Crematogaster *sens. str.* (Santschi's subgenus Eucrema), has small females, with small gaster like that of the worker, and with smooth integument quite unlike that of the worker, and is therefore, in all probability, a temporary social parasite. More suggestive in this connection are two species (*kennedyi* and *creightoni*) of the subgenus Acrocœlia which I described recently (1930, 1933) from nests of our common North American *C.* (*A.*) *lineolata* Say as workerless parasites. Except in possessing well-developed wings they are strictly comparable to the females and males of the Atitlan colonies. Obviously in all three cases we are dealing with parasites that are phylogenetically descended from their respective host species and have completely lost their worker caste.[2] This derivation seems to be more recent in the North American Acrocœlias than in the Atitlan form since in the latter both castes have lost their wings. The series of other known workerless parasites suggests that aptery develops sooner in the male than in the

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[1] Emery (1897) described and figured an old mother queen of *Oxygyne ranavalonœ* Forel of Madagascar as strongly physogastric like the old mother queens of *Anergates atratulus*.

[2] For an account of the considerable number of Aculeate parasites that may be derived phylogenetically from their host genera or species see my paper of 1919. The parasitic Vespids, *Vespula austriaca*, *omissa* and *adulterina* and the parasitic bumble-bees of the genus Psithyrus are strictly comparable with the winged workerless parasites among ants belonging to the genera Wheeleriella, Epœcus, Labauchena, Pseudoatta, Sympheidole, Epipheidole, Gallardomyrma, etc.

female. Thus in *Bruchomyrma acutidens* Santschi, an Argentinian parasite of *Pheidole nitidula strobeli* Santschi, the female has large though veinless wings but the wings of the male are considerably reduced; in the Congolese *Anergatides kohli* Wasmann, a parasite of *Pheidole megacephala melancholica* Santschi, the wings in the female are like those of *Bruchomyrma*, but the male is subapterous, and in the well-known European *Anergates atratulus*, which parasitizes *Tetramorium cæspitum*, the female has well-developed, veined wings, but the male is completely apterous. The final stage is represented by the Atitlan Crematogaster, in which, as I have repeatedly stated, both sexual castes are apterous. Nevertheless, the loss of the wings seems to have been so recent that it has affected neither the volume and structure of the thorax nor the volume of the wing-musculature. Mating in this form must, of course, occur in the nest and between brothers and sisters (adelphogamy), as in Anergates, but there can be no dissemination flight as in that species. The females, as soon as they are mature and have been fecunded, very probably wander away from the nest singly, and, in order to insure the rearing of their brood, enter and secure adoption in weak colonies of the host species.

We have still to consider the taxonomic status of the Crematogasters discussed in the preceding paragraphs. The complete aptery of the sexual phases, whether we regard them as representing an independent species or as cospecific with the workers, is a character of sufficient importance to justify the erection of a new subgenus. Since I have interpreted the sexual forms as workerless parasites I propose the name *Apterocrema* subgen. nov. for the males and females and describe them below as a new species, *atitlanica*. The workers, however, would belong to a new subspecies of *sumichrasti*, for which I propose the name *maja*, allied to Forel's subsp. *surdior* and therefore belonging to the subgenus *Orthocrema*. Should the future investigator succeed in demonstrating that the sexual castes and workers are cospecific, he might be willing to retain my subgeneric name, but *maja* would, of course, become a synonym of *atitlanica*.

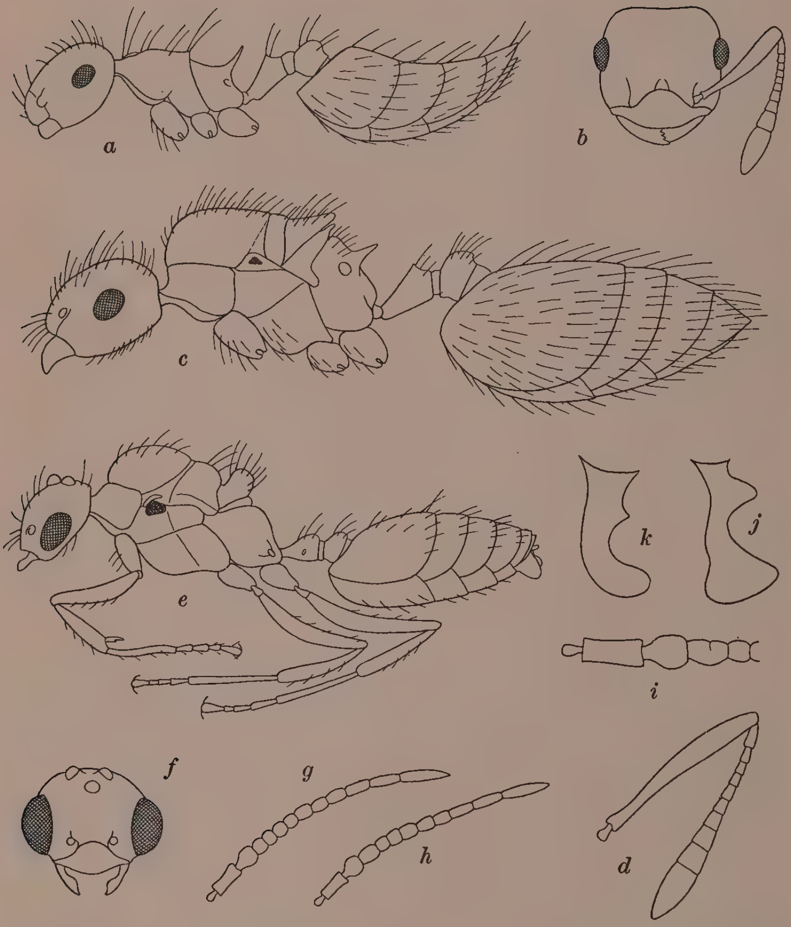

Fig. 1. *a*, *Crematogaster* (*Orthocrema*) *sumichrasti maya* subsp. nov. Worker in profile; *b*, head of same, dorsal view; *c*, *C.* (*Apterocrema*) *atitlanica* sp. nov. female in profile; *d*, antenna of same; *e*, male in profile; *f*, head of same, dorsal view; *g*, 12-jointed left and *h*, 11-jointed right antenna of same male specimen; *i*, four basal joints of another male specimen more enlarged, showing partial division of third joint; *j*, volsella of male *atitlanica*, *k*, volsella of male *sumichrasti* (typical).

Crematogaster (Apterocrema) atitlanica sp. nov.

Female. Length: 4.3-4.5 mm.

Very similar to the female of *sumichrasti* but differing in the following characters: Head slightly narrower in proportion to its length; eyes distinctly larger, very nearly as long as their distance from the anterior corners of the head; clypeus more flattened in the middle anteriorly, between the carinæ, which are sharper than in *sumichrasti.* Wings absent, but tegulæ of fore wings persisting as minute, elongate scales articulated to a small, heavily sclerotized and, in the pupa and callow, black area. Epinotal spines longer and usually more slender and more acute than in *sumichrasti.* Petiole and postpetiole narrower and less robust.

In sculpture and pilosity very similar to *sumichrasti,* but the rugosity of the sides of the epinotum is sharper, as is also the punctuation of the petiole and postpetiole, the latter also longitudinally striolate. The sparse golden pilosity is as in *sumichrasti,* very long and conspicuous on the gaster and dorsum of the pedicel, thorax and head, shorter but coarse on the scapes, gula and legs.

Black or very dark brown; thorax and pedicel in less mature specimens reddish brown, especially along the sutures; legs and antennæ dark brown; mandibles, tips of scapes, clubs of funiculi, coxæ, trochanters, tarsi and posterior borders of gastric segments brownish yellow.

Male. Length 2.5.–2.8 mm.

Structurally very similar to the male *sumichrasti.* Integument thin and collapsible. Mandibles and antennæ as in *sumichrasti,* the former small and acute but edentate, the latter usually 11-jointed, with the third joint (second funicular) entire or partially divided, sometimes 12-jointed, when the division is complete, more rarely 10-jointed. The three terminal joints are apparently stouter than in *sumichrasti.* Thorax wingless; with vestiges of tegulæ as in the female. Volsella of genitalia much more expanded at the tip than in the male *sumichrasti.*

Sculpture and pilosity as in that form. Ivory white; head, except the clypeus, mandibles and mouthparts, dark brown, especially posteriorly; tibiæ and gaster paler brown, segments of the latter dull yellowish at the base and along their posterior borders. Thorax with a conspicuous small black spot on each side at the tegular insertions as in the immature female and also as in the male *sumichrasti.*

Crematogaster (Orthocrema) sumichrasti maya subsp. nov.

Worker. Length 3–3.3 mm.

Very similar to the typical *sumichrasti* but differing as follows: Clypeal carinæ more pronounced, antennal scapes extending only 1/5 their length beyond the posterior border of the head (in *sumichrasti* ¼); lateral marginations of mesonotum and denticles at its posterior end more pronounced as in the subsp. *surdior;* epinotal spines longer and more distinctly recurved; petiole more narrowed anteriorly.

Sculpture as in *sumichrasti* but the mandibles more coarsely striated and more opaque and the pronotum longitudinally rugulose.

Pilosity yellow as in *sumichrasti* and very long, especially on the thorax and gaster.

Black or brown black, much darker than the subsp. *surdior;* mandibles, club of antennæ, trochanters and tarsi brownish yellow.

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NEW AND LITTLE-KNOWN NEOTROPICAL STRATIOMYIDÆ (DIPTERA) IN THE MUSEUM OF COMPARATIVE ZOOLOGY

By Maurice T. James

Colorado State College

A small collection of Neotropical Stratiomyidæ, kindly sent to me by Dr. Nathan Banks, contained a number of interesting species, several of which are here described as new. All types are being returned to the Museum of Comparative Zoölogy, Cambridge, Mass.

Monacanthella, new genus

This genus is proposed for the reception of a remarkable species which may readily be distinguished from other described Clitellariinæ by the peculiar structure of the scutellum; instead of being unspined or with paired spines, as in other members of this sub-family, the scutellum terminates in a single, median, conical spine, which is elevated at a slight angle to the rest of the scutellum. The exact relationship of this genus is hard to determine; in its slender form and general type of wing venation, it suggests *Meringostylus,* though the antennæ are quite different.

Diagnosis. Female. Eyes dichoptic, separated by two and one-half times the width of the ocellar triangle, bare; front of equal width; the face broadening out toward the oral margin. Ocellar triangle somewhat longer than wide, removed some distance from the occiput. Antennæ situated somewhat below the middle of the head in lateral profile, but remote from the oral margin; ten-segmented, the first three subequal, the subsequent ones gradually decreasing in length; segments one and two distinct, each with a number of apical hairs on each side; segments three to seven inclusively distinctly separated, each segment with a subbasal hair on each side, and bearing sensory pits; segments eight to ten inclusively indistinctly separated and without sensory pits; a subbasal hair on each side of each of these segments, and, in addition, on segment ten, a more conspicuous apical bristle and two subapical ones. Proboscis short, flattened dorso-ventrally. Mesopleura conspicuously narrowed in front. Legs elongate, the coxæ three or four times as long as the trochanters. Wings slightly longer than the abdomen; veins R_{2+3} and R_4 longer than, cross-vein r-m almost as long as, the width of the discal cell; the discal cell slender, veins M_1 and M_2 arising together at its apex; the branches of the media, cubitus, and anal veins distinct almost to the posterior wing margin; cell 2nd A elongate and definitely narrower than 1st A. Abdomen five-segmented. General body form elongate, the entire body being six or seven times as long as wide.

Genotype: *Monacanthella gracilis,* new species.

Monacanthella gracilis, new species

Female. Most of front, vertex, including the ocellar triangle and the ocelli, occipital orbits, and occiput above, shining black, the occiput below the foramen becoming brownish yellow; occipital orbits prominent above, with somewhat of a bluish sheen, narrower behind the eyes; the front just above the base of the antennæ, face, and proboscis yellow; antennæ yellow, darkening apically. Thorax yellow, with mere vestiges of three black stripes anteriorly; minutely

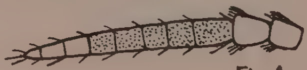


Fig. 1.

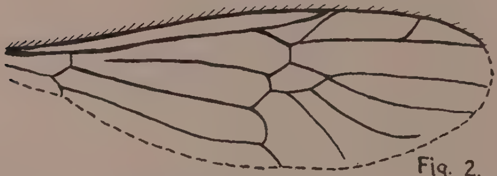


Fig. 2.

Fig. 1. *Monacanthella gracilis,* n. sp. Antenna.
Fig. 2. *Monacanthella gracilis,* n. sp. Wing.

punctured or rugulose dorsally; scutellum and spines yellow. Abdomen yellow in ground color; segments two to five inclusively with extensive blackish markings dorsally, which on segments two, four and five nearly cover the tergites, except for the lateral margins and a basal triangle on each side; the black on segment three similar, except that the apical two-fifths of the tergite is wholly yellow; venter yellow. In addition to these segments, four genital segments form a rather slender ovipositor which terminates in a pair of cerci that extend some distance beyond their segment. Legs yellow; the posterior femora narrowly darkened apically and basally; the hind tibiæ darkened on their inner sides. Wings grayish brown, paler basad of the arculus and beyond vein R_4; also a median pale band running from the position of the stigma across the apices of the two basal cells and the base of the discal cell, and terminating in the wing margin in the fifth posterior cell; the veins crossed by this band, including cross-vein r-m, white; the veins otherwise brown. Pile of entire body very sparse, yellow. Length, 7 mm.

Holotype: female, Hamburg Farm, Costa Rica, April 6 (C. W. Dodge).

Microchrysa abdominalis, new species

Male. Head and thorax bright metallic green, with cupreous reflections in certain lights; antennæ bright yellow; the proboscis, humeri, wing-bases, and a region below and behind each wing base, including the pteropleura, metapleura, and metanotum, pale yellow, not metallic; a narrow pale yellow stripe connecting the humeri and the wing bases; the extreme apex of the scutellum yellow; postscutellum yellow. Halteres yellow, the knobs whitish. Legs and abdomen pale yellow, the latter with abundant, but short, appressed pile, which is black above, yellow below. Wings hyaline; stigma and strong veins yellow. Length, 3 mm.

Female. Front broader than face, metallic green. Abdomen variable: typically, it seems to be yellow, with a strong metallic green reflection over the greatest part, though two specimens seem to be metallic green in ground color, with a variable amount of non-metallic yellow basally and laterally. Otherwise as in the male.

Holotype: male, Ancon, C. Z., July 15, 1924, No. 685 (W. M. Wheeler).

Allotype: female, Los Amates, Guatemala (Kellerman).

Paratypes: 1 male, 1 female, same data as holotype; 1 male, same data as allotype; 1 male, Gamba, C. Z., 1924 (N. Banks).

Teneral specimens, not designated as types: 1 male, Canal Zone, June 30, 1924 (Banks); 1 male, Hamburg Farm, Costa Rica, April 6 (C. W. Dodge).

Kertesz, in his catalogue of the Diptera, refers *Sargus bicolor* Wd. to *Microchrysa,* and Wiedemann's description of the species, as far as it goes, fits *abdominalis.* However, Curran (1931) has shown that *S. bicolor* belongs to a different genus, quite remote from *Microchrysa,* which he has named *Neurota. M. abdominalis* is in all respects a typical *Microchrysa.*

Isosargus lateralis, new species

Related to *I. texanus* Melander and *I. nigricornis* Loew; but readily distinguished from both those species by the yellow pleura. If *Microchrysa nova* G. T. is an *Isosargus,* as the description would indicate, it also belongs in this related group of species; but, like *texanus* and *nigricornis,* it also has metallic green pleura.

Female. Upper part of front and entire vertex metallic green; the pile short, pale; some longer pile, pale and black intermixed, on the vertex; the usual supra-antennal cross-band white; face yellow, becoming blackish toward the oral margin; its pile short, pale. First and second antennal segments yellow, black-pilose; third segment orange; arista yellow, with a very few black hairs at its extreme base. Proboscis orange. Dorsum of thorax metallic green, the humeri and extreme apex of the scutellum yellow; its pile yellowish to white; pleura yellow, the margin from the humeri to the wing-bases white; pectus black, non-metallic. Abdomen wholly metallic purple; dorsally, with short stubby black pile, ventrally with softer, semi-appressed yellow pile. Legs wholly pale yellow; the coxæ slightly darkened; pile concolorous, except for a little black pile on the apical tarsomeres. Wings grayish hyaline; venation normal; veins black; basal section of the media, and branches M_1 and M_3 somewhat weakened. Length, 6.5 mm.

Holotype: female, Barro Colorado Island, Canal Zone, June 20, 1924 (N. Banks).

The apex of the abdomen is somewhat eaten by dermestids, but the specimen, except for the lack of genitalia, is not materially damaged.

Merosargus banksi, new species

Related to *ethelia* Curran, but, among other things, the face is wholly yellow, the metapleura are yellow, there is a prominent black spot on each mesopleuron, and the abdomen is differently marked.

Male. Vertex and front above black; the usual transverse white band broad; front below this band, and all the face, proboscis, and palpi, pale yellow. Head pale-pilose. First and second antennal segments yellow, black-pilose; the third orange; arista brownish to black, bare. Front with a median, somewhat raised, polished vitta, extending from the white transverse band to the ocelli; frontal orbits conspicuously and moderately coarsely punctured. Thorax metallic green shining on a black background dorsally, yellowish on the sides of the mesonotum, the black background extending to the lateral margins at the suture; scutellum, except the narrow apex, and metanotum, metallic green; a triangular non-metallic black spot on each mesopleuron; otherwise yellow. Legs yellow; the apical third of the posterior femora black; the posterior tibiæ, except for the median third, black; middle tibiæ blackish at the base. Pile of the thorax and legs pale, except for a little black pile on the apical tarsomeres. Abdomen black, with bluish or purplish reflections; the bases and apices of all segments yellow; pile concolorous with the background. Genitalia yellow. Venter brownish-yellow, with pale pile. Wings hyaline; veins black. Length, 7 mm.

Holotype: male, Barro Colorado Island, Canal Zone, June 23, 1924 (N. Banks).

Merosargus abana Curran

Three males, though considerably different from the females of this species, probably belong here. They bear the same data as Curran's types, and are associated with a female which fits his description perfectly, except that the pale pile of the mesonotum somewhat overshadows the black pile, and that the color of the mesonotum is more diluted. Structurally, the males are the same, the differences being color differences, which, in this genus, are unreliable indicators. The differences are as follows:

Dorsum of thorax, scutellum, a spot on each mesopleuron anterior to the wing base, and metapleura black; tibiæ, tarsi except the posterior basitarsi, and basal half of posterior femora, black; first and second abdominal segments, except the apex of the latter, black; the abdomen, therefore, is black, with the narrow apices of segments two and three, and the posterior angles of four, pale.

1 female, 3 males, Sa. Emilia, Pochuta, Guatemala, 1000 m., Feb.-Mar., 1931 (J. Bequaert).

Acanthinomyia pulchella, new species

A handsome species, readily distinguished from the other described species of this genus by the hyaline wings, the less elongate form, the more sparsely pilose eyes, the lack of an area of differentiated pile on the eyes, etc.

Male. Head entirely reddish yellow, except the occiput and the ocellar triangle; the former, however, is broadly margined with yellow. Eyes reddish yellow, their pile long and moderately sparse, black on the upper, yellow on the lower half; there is no area of longer, thicker pile as in the other species of the genus. Antennæ yellow, somewhat shorter than the head. Pile of head yellow, except for the longer, black pile of the vertex, and a fringe of dense, appressed, silvery white pile bordering the front and face along the inner margin of the eyes. Thorax black, robust, clothed with dense, semi-appressed, straw-yellow pile, and, in addition, on the dorsum, with sparse, erect, rather long, black pile; on the dorsum are four black stripes, lacking the appressed pile, which extend from the anterior margin of the mesonotum to the base of the scutellum; the two outer stripes end just beyond the outer basal angles of the scutellum; the median ones extend onto the disc of the scutellum and fuse there. Scutellum and its four spines black, the latter red on their apical half, yellow-tipped; the spines are set on the definitely margined apex of the scutellum. Abdomen black in ground color, except the apices of segments four and five, which are red, ventrally and dorsally; a considerable amount of black appressed pile on the median three-fourths of segments one to three inclusively, a little of this extending onto the base of segment four; segments one to three laterally, segment four for the most part, and segment five wholly, with straw-yellow pile, that of the venter being entirely pale and almost white. Legs mostly blackish or reddish-black, the extreme apices of the femora and bases of the tibiæ, and the middle basitarsi, yellow; pile yellow, that of the inner sides of the tarsi golden. Wings yellowish hyaline, the veins distinctly yellow; cross-vein r-m very short, almost wanting, the discal cell with an appendiculate extension in that direction. Stigma distinct, yellow. Length 5.5 mm.

Holotype: male, Cordoba, Mexico (Mann).

Although this species does not agree with all the diagnostic characters of the genus as given by Kertesz in his *Monograph of the Notacantha,* as the foregoing description will indicate, still I can see no reason for not placing it here.

DESCRIPTIONS AND RECORDS OF NEARCTIC MECOPTERA

By F. M. Carpenter

Museum of Comparative Zoölogy

During the past year so many unusual and interesting Nearctic Mecoptera have come under my observation that it seemed justifiable to publish an account of them at this time, even though another summer will probably add to the list. The most remarkable collection which I have yet received for determination was sent by Professor O. L. Cartwright, of Clemson College, South Carolina. Included in this lot were the females of three species (*flexa*, *banksi*, and *acuta*) previously known only from males; a long series of specimens of a species (*flexa*) formerly known solely from the holotype; another long series of a second species (*banksi*), which, although described forty years ago, has been known only from 3 specimens; and 5 species not previously recorded from the state of South Carolina. Other specimens forming the basis of this paper have been received from Professor R. C. Smith and Professor H. B. Hungerford of Kansas, Professor H. E. Jaques, Iowa Wesleyan College, and Mr. Robert Goslin, Lancaster, Ohio. To these entomologists I owe many thanks for the opportunity of studying their material.

Family Panorpidæ

Panorpa flexa Carp.

Figure 3

Psyche, 1935, 42:108, fig. 2.

This species was described from a single male collected in the Smoky Mountains, N. Carolina. Among the Mecoptera sent by Professor Cartwright there are 3 males and 7 females from North and South Carolina, as follows:

SOUTH CAROLINA: 1 ♀, Rocky Bottom, Pickens Co., May 5, 1934 (O. L. Cartwright); 1 ♀, Rocky Bottom, May 31, 1933 (O. L. C.); 1 ♀, Rocky Bottom, June 1, 1933 (J. G. Watts); 1 ♂, Pinacle Mt., June 19, 1934 (O. L. C.); Earls' Ford, Pickens Co., July 8, 1933 (O. L. C.). NORTH CAROLINA: 2 ♂, 1 ♀, Sunburst, June 30, 1935 (O. C. L.); 1 ♀, Sunburst, June 14, 1934 (O. L. C.).

The wing membrane of the holotype of *flexa* was colorless, but the wings in the additional specimens show a surprising variation in color, surpassed in Panorpa only by that in *P. canadensis*. In half of the specimens listed above the wing membrane is colorless, and the markings are much reduced; whereas in the rest of the specimens the membrane is yellow and the markings are strongly developed. The female is similar to the male in coloration and markings. The internal skeleton within the 9th abdominal segment is large and resembles that of *sigmoides*, but differs in the curvature of the projecting part of the axis. In the key to the females of *Panorpa* contained in my revision of the Nearctic Mecoptera (Bull. Mus. Comp. Zoöl., 72: p. 225, 1931), *flexa* will run to couplet 15, and can be distinguished from the other species included there only by the structure of the internal skeleton. The female from Sunburst, N. Carolina, June 14, 1934, is designated as the allotype and deposited in the Museum of Comparative Zoölogy.

Panorpa anomala Carp.

Bull. Mus. Comp. Zoöl., 1931, 72:245.

Since this species has previously been known only from the types collected in Leavenworth and Douglas Counties, Kansas, it is of unusual interest to have the species turn up in Arkansas (Washington Co., May 21, 1928). Several specimens of both sexes from that locality were sent to me by Professor R. C. Smith. This record indicates that the species probably also occurs in Missouri and Oklahoma, from both of which states I have seen almost no specimens of Panorpa.

Panorpa venosa Westwood.

Trans. Ent. Soc. London, 1846, 4:190.

Four specimens of this species collected in Jones and

Madison counties, Iowa (June 9, July 7, 1932), were sent to me by Professor H. E. Jaques. These are the first specimens which I have seen from that state, though Ebsen-Petersen recorded it many years ago from there.

Panorpa banksi Hine

Figure 2

Trans. Ent. Soc. Amer., 1895, 72:315 (*affinis* Banks, nec Leach).

This rare species has previously been known only by the male type, which was collected in New York State, and two males from Pickens County, S. Carolina, recorded in my revision (1931). In the material recently sent by Professor Cartwright, there are 7 males and 1 female, all from Rocky Bottom, Pickens Co., S. Carolina: 4 ♂, 1 ♀, May 22, 1934; 1 ♂, June 21, 1933; 1 ♂, May 31, 1933; all collected by O. L. Cartwright and J. G. Watts. These new specimens are most interesting because all have the first marginal spot on the fore wings. This was a characteristic that I was unable to discern definitely in the type, which is a badly damaged specimen. Strangely enough, the two additional specimens which I saw from South Carolina in 1931 lacked the first marginal spot. The new material indicates that the absence of this spot is not a constant specific characteristic in *banksi,* although in all other Nearctic species of Panorpa so far known the presence or absence of the marginal spots is perfectly constant in at least 99% of the specimens.

The female of *banksi,* which is now known for the first time, is like the male in coloring. The internal skeleton of the 9th abdominal segment is large, but is unusual in possessing a very short axis, which does not project beyond the plate. The female collected at Rocky Bottom, Pickens Co., May 22, 1934, is here designated as the allotype and is deposited in the Museum of Comparative Zoölogy. In my key to the females of Panorpa (1931, p. 225), this specimen runs to couplet 18, where it is readily separated from *rufescens* and *interrupta* by the structure of the internal skeleton; but females lacking the first marginal spot, should any turn up, will run to couplet 15, where the internal skeleton will again provide easy recognition.

Panorpa submaculosa Carp.

Bull. Mus. Comp. Zoöl., 1931, 72:255.

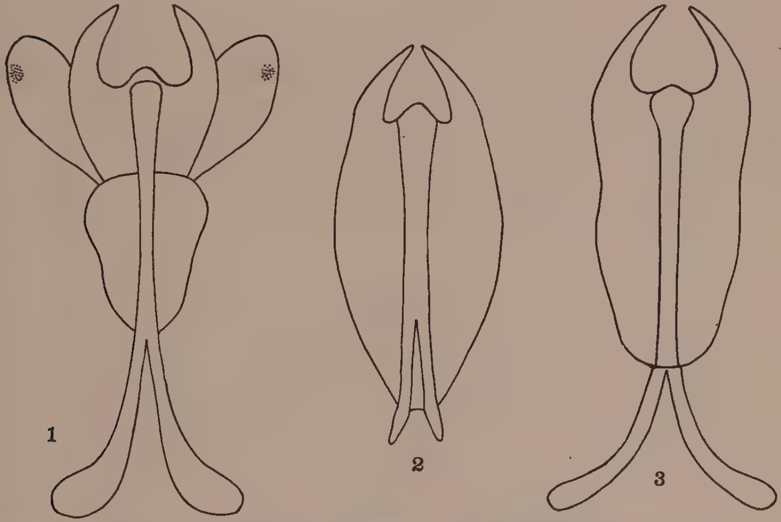
Eleven specimens of this species were included in the collection sent by Professor Cartwright, ten from S. Carolina (Pickens Co., May 31, 1933), and one specimen from Georgia (Raburn Bald Mt., Raburn Co., June 13, 1933). These are the first records of *submaculosa* in either state, and they greatly extend the range of the species, which has previously been known only from Michigan, New York, Ohio and Maryland.

Panorpa acuta Carp.

Figure 1

Bull. Mus. Comp. Zoöl., 1931, 72:253.

Nine specimens of *acuta* taken in S. Carolina (Pickens Co., May 31, June 21, August 25), and 3 in Georgia (Raburn Bald Mt., Raburn County, June 13) were sent by Professor Cartwright. These constitute the first record of the species



Figs. 1-3. 1. Internal skeleton of 9th sternite of *Panorpa acuta* Carp. (allotype). 2. Same of *Panorpa banksi* Hine (allotype). 3. Same of *Panorpa flexa* Carp. (allotype).

in those states. Three of these specimens being females we are able to determine satisfactorily the structure of the internal skeleton. In all other localities at which *acuta* has been collected, very similar species (such as *maculosa* and *nebulosa*) have also occurred, and in view of the relative scarcity of specimens of *acuta*, it has not been possible previously to identify the female of that species. As I pointed out in 1933, although I had seen 75 males from scattered localities, I was not certain of the female. But the three females sent by Professor Cartwright were taken with the males of *acuta*, and no other species resembling *acuta* was secured at that locality. An examination of the ninth sternite of the female and of the internal skeleton shows several points of difference from those structures in *nebulosa*. It is now clear that several of the females of the *nebulosa* group which I have previously seen were *acuta*, though it was not possible to correlate the sexes. This has now been done. The internal skeleton is close to that of *nebulosa*, but the axis projects further beyond the plate, which is also distinctly shorter. Furthermore, there is a supplementary plate which adheres to the inner surface of the 9th sternite, and which bears two black spots; these spots can be seen faintly through the sternite itself, when the insect is examined under a bright light. This supplementary plate is like that of *latipennis*, but in the latter it is situated further posteriorly. *Latipennis* and *acuta* are the only known species which possess this supplementary plate.

The female collected at Rocky Bottom, Pickens Co., S. Carolina (June 21, 1932), is here designated as the allotype and is deposited in the Museum of Comparative Zoölogy.

Family Bittacidæ

Bittacus strigosus Hagen

Synop. Neur. N. Amer., 1861, p. 246.

One male of this species, contained in Professor Cartwright's collection, is the first record from South Carolina (Clemson College, June 27, 1931).

Bittacus stigmaterus Say

West. Quart. Rep., 1823, 2:164.

One male, collected at Clemson College, S. Carolina (July

8, 1932) by O. L. Cartwright, is the first record for that state.

Bittacus occidentis Walker

Cat. Neur. Brit. Mus., 1853, p. 468.

Two specimens were collected at Clemson College, S. Carolina, September 14, 20, 1932, by O. L. Cartwright. This is the first record in the state.

Family Boreidæ

Although no new species of Nearctic Boreus have come to my attention during the past year, a great many specimens have been received, some belonging to species which have previously been little-known. Of particular interest is a long series of both sexes of *gracilis*, which was described only from two females. The new females show that the type specimens of this species were slightly damaged to the extent that the long hairs covering the body had been rubbed off, producing the effect of a short pubescence. Since the nature of the pubescence was one of the characteristics which I made use of in my previous key to the females of Boreus (Psyche, 42:112, 1935), undamaged specimens of *gracilis* will not run to that species. In this connection, also, I wish to correct certain errors which were introduced into the above mentioned key. In some way the statements in couplet 7 were confused with those of couplet 6, and the changes escaped my notice in the proof. The descriptions of the species concerned are of course correct, but for the sake of clarity and to correct the position of *gracilis*, I include here another key to the females of the Nearctic species of Boreus.[1]

Key to the Females of Boreus

1. Fore wing reduced to a minute scar, similar to that of the hind wing..*reductus* Carp.
   Fore wing in the form of a small oval pad......................2.
2. Wings and body the same color (brown or black)..........3.
   Wings much lighter (yellow or yellow-brown) than body (dark brown or black) ....7.

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[1] A typographical error in the key to the males of Boreus (ibid. p. 111) is also misleading: in the second line of couplet 1, the number should be "9" not "8."

3. Ovipositor short, only as long as rostrum........................4.
   Ovipositor distinctly longer than the rostum...................5.
4. Body either black or very dark brown......*brumalis* Fitch.
   Body light brown or medium brown....*nivoriundus* Fitch.
5. Body covered with fine, white pubescence....*unicolor* Hine.
   Body covered with long, white or yellowish hairs..........6.
6. Wing pads somewhat brownish proximally; body above dull or with a very slight shine...............*gracilis* Carp.
   Wing pads entirely jet black; body above very shiny.......... *nix* Carp.
7. Ovipositor scarcely longer than the rostrum..................... *intermedius* Lloyd.
   Ovipositor one and one-half times as long as rostrum....8.
8. Body light brown or reddish brown....*californicus* var. *californicus* Packard.
   Body black or nearly so...9.
9. Body black, but with a pronounced bronze hue, abdomen above exceedingly shiny.........................*borealis* Banks.
   Body jet black; abdomen above with only a slight shine *californicus* var. *fuscus* Carp.

Boreus brumalis Fitch

Amer. Journ. Agric., 5:278, 1847.

The first Ohio record of this species was secured in 1933. Since that time Mr. Robert Goslin, one of the first to find the insect in that state, has been on the alert for additional material, and as a result has collected an astonishingly large number of specimens from Hocking and Fairfield Counties. In December (1935) he secured about 225 specimens, in January about the same number, and in February over 326 specimens, making a total of more than 775 individuals! In one day alone (Feb. 3) Mr. Goslin collected 159 specimens. The notes which Mr. Goslin made concerning his captures are particularly interesting in showing the activity of these insects in different temperatures. Many of the specimens were found actively walking about during early December before any snow had fallen; most of these were collected on moss. The majority of the specimens, however, were taken on snow on days when the temperature was not far from 32° F. On December 31, following a temperature of —12° F. the night before, only 3 specimens (all females) were found on the snow and one of these was dead. But apparently falling snow or rain does not interfere with the activities of these insects; on December 23, 1935, Mr. Goslin collected 19 specimens during the course of a light snow fall, and again on January 9th he secured 7 specimens during a light rain.

Several hundred living specimens of *brumalis* were sent to me by Mr. Goslin, at my request, in the hope that it would prove not too difficult to rear them. The insects lived for several weeks, some for more than a month, and a great many eggs were secured; but the eggs failed to hatch. The antics of the male in bringing about copulation are most amusing. After approaching to within about half an inch of a female, he suddenly leaps in the air and onto the back of the female, turning himself over in the process of the jump so that he alights on his own back. Even during the process of landing he grasps her with his hook-like wings around the thorax or abdomen, and then seizes the end of her abdomen with his genital forceps. By a sudden twist he upsets the balance of the female, struggles to his feet, and runs around actively with the female held upside-down on his own back. I do not believe that copulation actually begins until the male has righted himself. It usually continues for several hours, and I have observed some pairs remain *in coitu* for as much as 12 hours.

Boreus nivoriundus Fitch

Amer. Journ. Agric., 5:277, 1847.

Twenty-five specimens of this species were also collected by Mr. Goslin during December, January and February. As in other parts of its range, *nivoriundus* is not nearly so abundant as *brumalis*. Several living specimens were sent to me by Mr. Goslin, and their behavior during courtship and mating was similar to that of the preceding species.

Boreus intermedius Lloyd

Pan. Pacific Ent., **10**:119-120, 1934.

Three additional specimens (1 ♂, 2 ♂) of this little-known species have been sent to me by Mr. Lloyd; they were collected at McCarthy, Alaska, April 29, 1935.

Boreus gracilis Carp.

Psyche, 42:118; 1935.

A series of ten specimens (3 ♂, 7 ♀) of this insect were sent to me by Mr. Lloyd. 1 ♀ was collected at Kennecott, Alaska, April 15, 1935; and the rest at McCarthy, Alaska, April 29, 1935. This series is particularly interesting because the species has previously been known only from the two female types, and it now turns out that the type specimens were slightly damaged. The male is 3 mm. long; uniformly black except for the eyes (which are either black or dark brown) and the wings, which are sometimes brownish; the body including the wings but not the pronotum is covered with rather long white pilosity resembling that of *B. nix*, but not quite so prominent; pronotum with two rows of very long black hairs; wings with the outer margin almost straight as in *B. elegans* Carp. (see Psyche, 42, fig. 8, p. 121); hypandrium deeply emarginate, as in *B. nix* Carp. (Psyche, 42, fig. 7, p. 121); rostrum one and one-half times as long as the eye. One of the specimens taken at McCarthy, Alaska, April 29, 1935, is designated as the allotype and deposited in the Museum of Comparative Zoölogy.

The female is correctly described in my original account of the species, except that the body is covered with the long pilosity mentioned in the male; apparently the two type specimens were so badly rubbed that only the bases of the hairs remained, giving the appearance of a fine pubescence. The size of the wing pads seems to vary slightly but in the specimens so far collected the pads are shorter than in the other Nearctic species of Boreus, except of course *reductus* Carp.

This insect resembles *B. nix* Carp., from Montana, but is readily separated by the nearly straight outer margins of the wings in the male. *Gracilis* is the first Alaskan species found which possesses an emarginate hypandrium.

A LIST OF THE WEST INDIAN DRYOPIDÆ (COLEOPTERA), WITH A NEW GENUS AND EIGHT NEW SPECIES, INCLUDING ONE FROM COLOMBIA

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Since 1927, when I published a paper on the West Indian "Helmidæ" or Helminæ (*Psyche* 34, pp. 91-97), a considerable amount of additional dryopid material has come to hand. Most of it has been collected by myself during a trip to Cuba, Jamaica, and Haiti which I was enabled to make from August to November, 1934, through grants from the Milton Fund and Atkins Foundation of Harvard University. This paper is to report upon this material and to bring our knowledge of the West Indian fauna up-to-date by listing the species, sometimes with critical comments. It does not pretend, however, to be a complete revision.

By the "West Indies" I do not mean to include Trinidad, which is South American both geographically and faunistically. Among the Dryopidæ, the genera Dryops, Elsianus, and Heterelmis occur in Trinidad (collected by me in 1929) but are not, at least as yet, known from the West Indies proper, and one of the Trinidad species of Helmis (*s. lat.*) belongs to a group not yet known from the West Indies. In my 1927 paper I stressed the relationship of the West Indian species with those of Texas. Actually, of course, many of the species show close relationship with Central America as well as Texas, and there are some South American elements in the Lesser Antilles. The West Indian fauna and that of the adjacent mainland are still so imperfectly known that there is not much point in discussing affinities in more detail, except to note that the West Indian fauna is certainly depauperate.

The absence of Dryopidæ in many rivers and brooks in the West Indies is a striking phenomenon, worth recording in detail. In Jamaica I looked carefully for the family in several rivers and mountain brooks on the south slope of the main range of the Blue Mountains, in the Hope River near Kingston, and in several small, clear, rapid rivers near Ocho Rios on the north coast, but did not find a single specimen, although Dryopidæ are known from the island. I visited also the Rio Cobre above Spanishtown, which looked like good dryopid water but was too flooded for collecting. In Haiti I worked carefully in the river at Ennery and the brooks on Mt. Basil (northern Haiti), in the Rivière Cul de Sac and the Rivière Froide (near Port-au-Prince), and in various mountain brooks in the high Massif de la Selle (southeastern Haiti) up to over 6,000 ft. in the Rivière Blanche on the La Selle plateau, with equally little result. However, in the La Hotte region (southwestern Haiti) I found Dryopidæ in every river and brook examined, from the Ravine du Sud at Camp Perrin, under 1,000 ft., to a small brook at Desbarrière, just north of Mt. La Hotte, at about 4,000 ft., the highest running water I saw in the La Hotte region. Five genera and eight species of stream loving Dryopidæ were found in this region. Possibly extensive clearing of forests, resulting in heavy freshets, has eliminated the insects in places by tearing up the stream beds and destroying aquatic vegetation, while they survive where, as near La Hotte, the forest is mostly uncut or where conditions are favorable for some other reason.

The proportions given in my descriptions have been determined by actual measurements. The types of all new species are in the Museum of Comparative Zoölogy. I am much indebted to Mr. K. G. Blair for notes on some types in the British Museum.

Subfamily Psepheninæ

Psephenus Hald

Although this genus is not known from the West Indies, an understanding of its secondary sexual characters is important in dealing with its West Indian relatives. In *Psephenus lecontei* Lec. the ♂ differs from the ♀ as follows: average size smaller; prothorax less explanate at sides; pronotum less opaque; elytra slightly less distinctly substriate; antennæ slightly longer, heavier, and more nearly serrate; maxillary palpi longer, heavier, with last joint more triangular; front and middle tarsi not dilated but with soles first 2 joints with numerous rather short, slender papillæ; middle coxæ much more approximate, mesosternum between them narrower and more acutely impressed; abdomen with 7 ventral segments (6th showing only at sides of 7th, in emargination of apex of 5th), not 6 as in ♀.

Pheneps n. gen.

Generally similar to Psephenus, but more slender; head free; coxæ similar; last tarsal joint elongate, but not quite so much as in Psephenus; epipleuræ similar, nearly reaching apex of elytra; sexual dimorphism of palpi, mesosternum, and apical segments of abdomen similar. Differs from Psephenus in clypeus and labrum nearly in plane of front, not bent under head; in very long antennæ reaching to near middle of elytra at least in ♂, with 1st joint long, slightly bent, slightly thickened, 2nd less than ½ as long, slightly thickened, 3rd about length of 1st, but more slender, about 4 times long as wide in ♂, outer joints gradually shorter, subserrate at least in ♂; differs also in sides of prothorax not explanate, and in basal joint front and middle tarsi ♂ enlarged as well as with papillæ, broadly oval, several times bulk of 2nd joint, deeply emarginate apically. Differs from Psephenops in very elongate antennæ and in 2d joint ♂ tarsi small, though with sexual papillæ as in Psephenus. The genotype is

1. **Pheneps gracilis** n. sp. (Pl. III, fig. 5)

Male only. Moderately slender, depressed; dark grayish brown, mouth, bases of legs, last (sometimes) and apices of some or all other ventral abdominal segments testaceous; upper surface finely and very inconspicuously punctate, with fine, short, more or less decumbent gray pubescence, the direction of which varies on the elytra to form an irregular, variable, sericeous pattern in some lights. *Head* not quite 3/5 width prothorax; eyes large and prominent; clypeus very wide, short, free at sides; labrum equally wide and short; palpi and antennæ (♂) as described above. *Prothorax* transverse, about 2/3 wider than long, moderately narrowed anteriorly, apex about 3/5 width of base; sides more or less unevenly arcuate, nearly parallel basally, not margined, not explanate; base lobed before scutellum, broadly emarginate at sides; apex slightly arcuate anteriorly; basal angles acute posteriorly but not much produced, apical angles rounded-obtuse; disk more or less evenly convex, with faint longitudinal impressed line at middle near base. *Elytra* ample, together 3/10 wider than prothorax, sides slightly diverging in basal ½, broadly rounded to the independently rounded apices; surface with faint, irregular longitudnal impressions or striæ. Abdomen below with 2 basal segments deeply emarginate at middle, 1st entirely hidden by coxæ medially. Mesosternum and ♂ tarsi as described above. Length 4 or slightly more; width 2 or slightly more mm.

Haiti: holotype ♂ (M. C. Z. no. 21,785) and 5 ♂ paratypes (1 in U. S. N. M.) from Tardieu, in the valley just north of Mt. La Hotte (Pic de Macaya), about 3,000 ft., Oct. 14, 1934, taken with a light at night in depressions on stones in the turbulent Rivière Tardieu. The insects were a foot or so above water level on stones which were dry but entirely surrounded by water. They were apparently resting, but ran actively when disturbed. The ♀ characters of the genus have been taken from the following species:

2. **Pheneps cubanus** n. sp. (Pl. III, fig. 6)

Female only. Moderately slender, depressed; testaceous brown, paler below; upper surface dull and finely and densely roughened on pronotum, less so on elytra, not distinctly punctate; pubescence fine, short, subdecumbent, mixed with some slightly longer hairs, not forming sericeous patterns in any light. *Head* about 3/5 width prothorax; eyes large and prominent; front slightly concave at sides, faintly convex at middle; clypeus very wide and short, free at ends; labrum distinctly narrower; antennæ (last 5 joints missing) slightly finer and with slightly shorter joints than in *gracilis;* maxillary palpi shorter, finer, and with more oval apical joint. *Prothorax* transverse, about twice as wide as long, strongly narrowed anteriorly from the acute basal angles; sides not margined, not explanate, slightly arcuate basally, more so anteriorly where rounded into front margin; latter arcuate, almost lobed, at middle; base lobed before scutellum, broadly emarginate at sides; disk rather irregularly convex but without distinct impressions. *Elytra* ample, together 1/3 wider than prothorax, formed as in *gracilis* but surface even less distinctly impressed. Abdomen (♀) with 6 ventral segments, 1st and 2nd not emarginate at middle. Mesosternum (♀) broader and less acutely impressed between middle coxæ than in *gracilis* (♂). Front and middle tarsi (♀) slender, about as in Psephenus, without sexual papillæ. Length not quite 4; width not quite 2 mm.

Cuba: holotype ♀ (M. C. Z. no. 21,786) unique from Soledad, near Cienfuegos, Santa Clara, Nov. 2, 1926, taken by myself. I do not remember the circumstances of capture.

Of the numerous characters which distinguish this species from *gracilis* as described, the different form of the prothorax (not subparallel near base in *cubanus*) and the different color and more regular pubescence may be presumed to be specific characters. The more densely roughened pronotum, narrower labrum, and entire 1st and 2nd ventral segments of *cubanus* may prove to be either specific or sexual differences, probably the latter. The shorter, slightly differently formed antennæ and palpi, the fewer ventral segments, more widely separated middle coxæ, and much smaller basal joint of front and middle tarsi, without papillæ, are, by analogy with Psephenus, strictly sexual characters and are so treated in my generic description of Pheneps.

Psephenops Grouvelle

(*Xexanchorinus* Grouvelle)

Notes from the Leyden Museum 20, 1898, pp. 44 & 45.

The gentoype of Psephenops is *P. smithi* Grouv. All of the types of this species were ♂ ♂. Champion (Trans. Ent. Soc. London 1913, p. 63, Pl. 3, figs. 2 & 2a) believed he had a ♀ Psephenops with dilated tarsi and 6 ventral segments. However, Mr. K. G. Blair has kindly examined

Champion's specimen for me and writes that he thinks it is undoubtedly a ♂, with apical abdominal segments and mesosternum between the coxæ formed as in ♂ ♂ of allied genera. Actually the ♀ of Psephenops, as shown by my *P. haitianus* (below), has slender tarsi and differs from the ♂ rather strikingly in its larger size and differently formed prothorax. It happens that there is an insect, *Xexanchorinus latus* Grouv., described from the exact locality of one of the types of *Psephenops smithi,* which differs from the latter about as my ♀ *Psephenops haitianus* differs from the ♂. Mr. Blair has compared *Xexanchorinus latus* with *Psephenops smithi* (types of both in British Museum) and writes that the antennæ of the two are similarly constructed and the elytral sculpture much the same. Judging from the sketches in Mr. Blair's letter, the dimorphism of the prothorax is about as great as in the Haitian species, and I am convinced that *Psephenops smithi* is the ♂ and *Xexanchorinus latus* the ♀ of one species. The former name has page priority as to both genus and species.

In accordance with these conclusions, and taking into account the peculiar heteromerous structure of the ♂ tarsi in *P. haitianus*, the secondary sexual characters of Psephenops are these: ♂ smaller and narrower than ♀, with narrower and more rounded prothorax which is less explanate at the sides; mesosternum between middle coxæ very narrow in ♂, much broader in ♀; ♂ with 7, ♀ with 6 ventral segments conformed as usual in Psepheninæ; dimorphism of antennæ and palpi less than usual in subfamily; ♂ with first and second joints front and middle tarsi and *either* first and second *or* only first joint of hind tarsus dilated and conspicuously lobed below, with densely pubescent soles; ♀ with slender and simple tarsi. It will be noted that all of these secondary sexual characters are either foreshadowed or duplicated in Psephenus or Pheneps or both, and that sexual dimorphism of the prothorax occurs also in some species of Phanocerus.

3. *Psephenops smithi* Grouvelle ♂

(*Xexanchorinus latus* Grouvelle (♀))

L. c., pp. 45 & 46.

Grenada and St. Vincent. The type locality of *X. latus* is

Chantilly Estate (windward side), Grenada, whence came at least one of the types of *P. smithi.* Mr. Blair writes that the hind tarsus of the ♂ has two dilated and lobed joints, like the front and middle tarsi.

Psephenops maculicollis n. sp. (Pl. III, fig. 1)

Not West Indian, but described here because it is the only typical Psephenops I myself have had for comparison with the new West Indian species.

Male only. Psephenus-like, rather depressed; brown, head black; pronotum dull reddish testaceous, dusky across base, with large, round, shining, piceous mark at middle from apex to about 2/5 from base and extending in a fine line on carina nearly to base; each elytron with a short testaceous fascia from near humerus obliquely back and inward; dorsal surface with fine, short, close pubescence, relatively sparse on pronotum; head, middle of pronotum, and elytra especially near base, decreasingly distinctly, finely, and closely punctate; lower surface dark gray, appendages brown. *Head* about 4/7 width prothorax; eyes prominent; front transversely ridged between upper parts of eyes; clypeus broad and short; labrum much narrower; antennæ short, reaching to about basal angles of prothorax, 2 basal joints somewhat enlarged, 2nd slightly shorter than 1st or 3rd, outer joints progressively shorter to subapical (wider than long), apical slightly longer. *Prothorax* not quite 1¾ times wide as long, much narrowed anteriorly; sides straight anteriorly, strongly rounded before basal angles; latter right; anterior angles very obtusely rounded; base lobed at middle and emarginate at sides; apex slightly arcuate; lateral margins explanate basally; disk convex, slightly impressed near basal angles and each side near base in areas equidistant from each other and sides, strongly carinate at middle in basal 1/3. *Elytra* together about 3/10 wider than prothorax, somewhat shorter than abdomen, broadly, independently rounded apically; surface with usual indistinct stria-like impressions. Palpi, mesosternum, and apical segments of abdomen (dissected) as usual in ♂ Psepheninæ; 1st ventral slightly emarginate at middle; all tarsi with 1st and especially 2nd joints elongate, lobed, and with hairy soles. Length 2½; width 1 1/3 mm.

Colombia: holotype ♂ (M. C. Z. no. 21,788) unique from Rio Frio, about 20 mi. south of Santa Marta, Prov. of Magdalena, Feb. 25, 1928, taken on a stone in the Rio Frio River.

Differs from *Psephenops smithi* Grouvelle and *Ps. grouvellei* Champion (*l. c.*) in color and in having the sides of the prothorax strongly rounded near the base. The posterior tarsi are like those of *grouvellei* as figured by Champion.

4. **Psephenops haitianus** n. sp. (Pl. III, figs. 2 & 3)

Psephenus-like, rather depressed; dark brown, bases of legs, parts of lower surface, and base of elytra pale, pale area extending back (vaguely) on each elytron in a triangle 1/3 of length; upper surface roughened, especially on pronotum of ♀, not distinctly punctate, with fine, short, uniform, subdecumbent pubescence. *Head* small, just over ½ (♂) or less than ½ (♀) width prothorax; eyes prominent; front faintly concave; clypeus wide, short, free at ends; labrum narrower; antennæ moderate, reaching well (♂) or slightly (♀) beyond basal angles of prothorax, first 2 joints rather stout, 2nd about ½ length 1st, 3rd ½ longer than 2nd, outer joints progressively slightly shorter. *Prothorax* transverse, over 2 (♂) to about 2½ (♀) times wide as long; much narrowed anteriorly; sides not margined, not explanate, slightly and evenly arcuate (♂) or sinuate before the posterior angles (♀); latter acute; anterior angles very obtuse; base broadly lobed before scutellum, emarginate at sides; apex nearly truncate; disk convex, faintly depressed before posterior angles, very obsoletely carinate at middle of base. *Elytra* ample, together about 1/3 (♂) to ½ (♀) wider than prothorax; sides nearly straight and slightly divergent basally, broadly rounded to the independently rounded apices; surface with faint, longitudinal, stria-like impressions, more distinct in ♀, in which alternate intervals are slightly elevated near suture. Length (♂ ♀) about 2½ & 3½; width 1 2/5 & 2 1/10 mm. (exact measurement difficult because of position of specimens).

In addition to the differences in size, proportion, and sculpture, there are the following secondary sexual characters: antennæ and palpi relatively a little more elongate in ♂, but not much modified otherwise; prothorax sexually dimorphic in form, also more rounded dorso-ventrally at sides in ♂, more angulate in ♀, especially anteriorly; mesosternum very compressed between coxæ in ♂, much less in ♀; abdomen with 7 ventrals in ♂, 6 (apical visible only by dissection) in ♀; first ventral rather strongly emarginate at middle in ♂, much less in ♀; ♂ with first and second joints front and middle tarsi but only first of hind tarsus dilated, lobed below at apex, and with pubescent soles; ♀ tarsi slender, as in Psephenus.

Haiti: holotype ♂ (M. C. Z. no. 21,787) from Tardieu, just north of Mt. La Hotte, about 3,000 ft., Oct. 14, 1934, taken at night on a stone in the river with *Pheneps gracilis;* allotype ♀ from a small brook a few miles northeast of Mt. La Hotte, about 3,000 ft., Oct. 12, taken by holding a net in the current below a leafy sappling which had fallen into the brook and which I combed out thoroughly. In spite of the differences between these specimens there are so many points of exact correspondence — in details of the pale mark on the elytra, for instance, and in the faint sub-basal carina of the prothorax — that I feel certain they are one species.

The form of the ♂ hind tarsus distinguishes this species from all other known Psephenops. Possibly the difference may eventually prove to be of generic value.

Subfamily Dryopinæ

5. *Hexanchorus caraibus* (Coquerel)

Rev. Mag. Zoöl. (ser. 2) 3, 1851, p. 601, Pl. 15, fig. 14 (Potamophilus).

Described from Martinique and Guadeloupe.

6. *Phanocerus congener* Grouvelle

Notes from Leyden Museum 20, 1898, p. 46.

Grenada: described from Balthazar (windward side). This species should be compared with *P. clavicornis* Shp. of Central and South America.

7. *Phanocerus hubbardi* Schaeffer

Journn. New York Ent. Soc. 19, 1911, p. 119.

Jamaica and Haiti: described from the former without more definite locality. I have before me one ♂ topotype (same data as type) borrowed from the United States National Museum and 12♂, 11♀ from the northeastern foothills of the Massif de la Hotte, Haiti, 2–4,000 ft., Oct. 10-24, 1934, taken on water weeds, stones, and logs at water level in various rivers and brooks. These specimens are much darker than the Jamaican one, perhaps because of their greater freshness, and have the elytra slightly more strongly punctate. They are not so punctate as in *Ph. clavicornis* Sharp from Devil's River, Texas (♂ ♀ ♀, det. Schaeffer, borrowed from U. S. N. M.), however. The females in the Haitian series have the prothorax slightly more elongate, with sides more sinuate, than the males, so that I had separated the sexes even before examining the genitalia. A somewhat similar sexual difference exists in *clavicornis*, but not in the following species. The ♂ genitalia of all these species seem to be indistinguishable.

8. **Phanocerus helmoides** n. sp. (Pl. III, fig. 4)

Subparallel, rather elongate, convex; piceous brown, with fine, short, close pubescence; appendages brown, tibiæ, tarsi, and antennal club darker. *Head* 2/3 width prothorax. *Prothorax* subquadrate, ¼ (more or less) wider than long, only slightly more narrowed in front than behind; sides slightly or moderately arcuate, straight or slightly sinuate before base and apex; posterior angles right, anterior slightly obtuse but moderately prominent; explanate side margins conspicuous in anterior 1/3; apex arcuate; base strongly, sinuately lobed before scutellum; disk convex, with fine median longitudinal line, fine puncture each side of middle before base, rather fine groove each side from base 1/6 from side forward and then outward to just behind apical angle. *Elytra* slightly wider than prothorax, strial punctures rather fine, especially apically, more as in *hubbardi* than *clavicornis*. Length 2.3–2.8 by 1.1–1.2 mm.

Haiti: holotype ♂ (M. C. Z. no. 21,789) and 6♂, 6♀ paratypes (pair in U. S. N. M.) from the northeastern foothills of the Massif de la Hotte, southwestern peninsula, 2–4,000 ft., Oct. 10–24, 1934, taken in the same situations as the preceding.

The relatively weak convolutions of the prothorax differentiate this from *clavicornis, hubbardi,* and *congener,* and give it a slightly Helmis-like aspect.

9. *Lutrochus geniculatus* Chev.

Ann. Soc. Ent. France (ser. 4) 4, 1864, p. 406 (Lutochrus); Grouvelle, Bull., Soc. Ent. France 1896, p. 17.

Cuba and Haiti: described from the former without more definite locality. I have before me a specimen (over 4 mm. long) supposed to be from Cuba and one (3½ mm.) from the northeastern foothills of the Massif de la Hotte, Haiti, about 3,000 ft., Oct. 12, 1929. These specimens differ from *luteus* Lec. of the United States just as described in Grouvelle's key (*l. c.*). The Haitian specimen was secured from the same fallen sappling which yielded the allotype of *Psephenops haitianus.* Another specimen was seen at the crossing of the auto road and Rivière Glace a few miles away, but flew from the edge of my net before I could reach it.

10. *Throscinus schwarzii* Schaeffer

Journ., New York Ent. Soc. 12, 1904, p. 204.

Jamaica (and Texas): described from the latter, from Brownsville. I have specimens from Brazoria Co., Texas, and one from Kingston, Jamaica, Aug. 27–29, 1934, taken in vegetation in the edge of a small pond. The Kingston specimen is not quite so roughened above as the Texan ones, but agrees well otherwise.

11. **Throscinus æthiops** n. sp. (Pl. III, fig. 7)

Elongate oval, convex; rather shining black above, lower surface and appendages reddish except antennal club black; pubescence moderate, longer than in *schwarzi,* tending to mat as in *crotchi* Lec. *Head* with front pubescent, not very closely punctate, somewhat shining (when pubescence removed); antennæ with club 7-jointed (*i. e.* 5th joint stouter than 4th and distinctly triangular), 3rd joint somewhat longer than 4th. *Prothorax* just over ½ wider than long, much narrowed anteriorly practically from the base;

sides slightly, almost evenly arcuate; base and apex as usual; disk very convex, not distinctly impressed, inconspicuously punctate. Scutellum not distinctly punctate. *Elytra* about 1/8 wider than prothorax; sides subparallel basally, broadly rounded posteriorly to near apex, where strongly sinuate (as usual); disk relatively closely and coarsely punctate, secondary punctation very fine, scarcely detectable; surface rather shining. Lower surface dull and pubescent (as usual). Length between 2 1/5 & 2¼; width 1 mm.

Haiti: holotype (M. C. Z. no. 21,790) from Trou Caiman (a large fresh lake in the Cul-de-Sac about 25 km. northeast of Port-au-Prince), Nov. 15–20, 1934, in floating aquatic vegetation; 2 paratypes from vicinity Port-au-Prince, further data accidentally omitted.

As compared with *T. schwarzi, æthiops* is much more shining, with coarser primary and much finer and less obvious secondary elytral punctuation and longer and more matted pubescence. The antennæ are similar, with 7-jointed clubs, which distinguish the species from *crotchi* Lec. (type seen) and *politus* Casey (paratype seen, borrowed from the U. S. N. M.) of the United States, which have 6-jointed antennal clubs.

Pelonomus Er.

The following material constitutes an informal revision of all the species of this genus found north of South America.

Pelonomus obscurus obscurus Lec.

Proc. Acad. Philadelphia 6, 1852, p. 42; Horn, Trans. American Ent. Soc. 3, 1870, p. 31; Sharp, Biologia Cent.–Amer. 1, part 2, 1882, p. 122.

Not Antillean (Texas and probably neighboring regions): Leconte's types (examined by me) are from the "southern and western states." All are ♀♀ without more definite locality. They belong to the Texan form, of which we possess also 10♂, 10♀ labeled "Tex." This typical form is characterized by a relatively broad (but somewhat variable) prosternal fissure behind the eye and by having the claw joint of the ♂ front tarsus very broad, widest near the base.

12. *Pelonomus obscurus gracilipes* Chev. (Pl. III, fig. 10)
(*rufescens* Casey)

Ann. Soc. Ent. France (ser. 4) 4, 1864, p. 406; Casey, Coleop, Notices 5, 1894, p. 581.

Cuba (and Florida): Chevrolat's type was from the former; Casey's, from the latter. We have specimens from Soledad, near Cienfuegos, Santa Clara, Cuba, Aug., Oct., and Nov., and from Florida (Brighton near Lake Okeechobee, and Homestead); the species occurs in aquatic vegetation in ponds and is sometimes very abundant at light. The subspecies *gracilipes* differs from typical *obscurus* only in the usually narrower prosternal fissure and more slender anterior ♂ claw joint, which is parallel or slightly narrowed basally. Some of my Florida specimens are strongly rufescent like Casey's types, but the majority, and all the Cuban ones, are colored like typical *obscurus*. There is some variation in the form of the scutellum.

Pelonomus obscurus, both subspecies, has striking secondary sexual characters, some of which were noted by Sharp (*l. c.*). The last 2 joints ♂ maxillary palpi are very elongate, the subapical a little over ½ as long as the apical (in ♀ shorter, with relatively shorter subapical); the claw joint ♂ front tarsus is broader than in the ♀; the ♂ middle tibiæ are bent in at apex; and ♂ 3rd and 4th ventral segments are shortened or telescoped so that apical segment is relatively large and usually bent down. These characters are absent in the other Pelonomus known to me, and make recognition of *obscurus* easy. Moreover the ♂ genitalia of the latter are unique in that the lateral lobes are notched inwardly to receive the apex of the middle lobe.

P. obscurus is, of course, recorded from Mexico and Guatemala (Sharp, *l. c.*) as well as from the regions given above, but I do not know which subspecies is in Central America.

13. *Pelonomus picipes* (Oliv.) (Pl. III, fig. 11)
(*palpalis* Sharp)

Ent. 3, 1795, 41 bis, p. 4, Pl. 1, fig. 2 a, b, c (Dryops); Latreille, Hist. Nat. 9, 1804, p. 226; Lacordaire, Gen. Coleop., 1855, Atl. Pl. 24, fig. 1; Coquerel, Rev. Mag. Zoöl. (2) 3, 1851, p. 602; Sharp, Biologia Cent.-Amer. 1, part 2, pp. 122 (1882) & 774 (1887).

Guadeloupe (and Panama): described by Olivier from the former; Sharp's types were from the latter. I have before me a single ♂ from Gourbeyre, Guadeloupe, borrowed from the American Museum, which agrees well enough with the original description and figure and with Lacordaire's figure, and also 4 (both sexes) from Vulcan de Chiriqui, Panama, from Biologia material.

This species is very similar to *obscurus*, but lacks the secondary sexual characters of that species and has relatively longer posterior tarsi, about as long as the tibiæ. The lateral lobes of the ♂ genitalia are not notched. Sharp's species cannot be separated either by external or genitalic characters.

14. *Pelonomus insularis* Grouv.

Notes from the Leyden Museum 18, 1896, p. 33.

Hispaniola: described from both Santo Domingo and Haiti. I found specimens in Haiti at Etang Lachaux, southwestern peninsula, under 1,000 ft.; Poste Terre Rouge, north of the Cul-de-Sac, 2,000 ft.; Mt. Trou d'Eau, near by, 4,000 ft.; swamps north of Dessalines, near sea level; Ennery, 1,000 ft.; all Sept. to Nov., 1934; and we have 2 specimens from Diquini, near Port-au-Prince, W. M. Mann. The species occurs in aquatic vegetation and waterlogged trash in ponds or slow streams, not in rapid water.

Readily known by the very coarse punctuation of prothorax and elytra and by the traces of submarginal channels of the prothorax. The ♂ genitalia are as in *picipes*.

Subfamily Helminæ

All known West Indian Helminæ belong to Helmis as Sharp and Grouvelle understood the genus[1]. Moreover, the West Indian species are relatively few and are evidently derived from few sources.

15. *Helmis simplex* Darl.

Psyche 34, 1927, p. 96

Cuba: described from Soledad, near Cienfuegos, Santa Clara. Additional specimens were taken in August, 1934.

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[1] Musgrave, Proc. Ent. Soc. Washington 37, 1935, pp. 32—, has referred one West Indian species to Cyllœpus and has described a new genus for another.

16a. *Helmis cæsa minima* Darl.

Psyche 34, 1927, pp. 93 & 97; Musgrave, *l. c.*, p. 34 (Neoelmis)

Cuba, Jamaica, and Haiti: described from Soledad, near Cienfuegos, Cuba, where retaken in August, 1934. Occurs also in Jamaica (no definite locality) and Haiti, where I found it only in the southwestern peninsula, in the La Hotte region, in rivers and brooks from 1,000 to 4,000 ft., Oct. 10-24, 1934.

I think that the various geographical forms related to *Helmis cæsa* Lec. (*cf.* Musgrave, *l. c.*) are best considered as subspecies. I do not mean by this to question their validity, but to show their evident relationship as slightly modified forms of one original stock.

16b. *Helmis cæsa gracilis* (Musgrave)

L. c., p. 35 (Neoelmis).

Puerto Rico: described from Rio Cañas, Las Marias. We possess 2 paratypes, thanks to the generosity of Mr. Musgrave.

17. *Helmis filiformis* Darl.

(*jamaicensis* Darl.)

Psyche 34, 1927, pp. 94 & 97

Cuba and Jamaica: described from Soledad, near Cienfuegos, Cuba, and retaken in numbers in August, 1934. This larger series varies enough to show that the Jamaican form is probably synonymous.

18. *Helmis smithi* Grouv.

Notes fr. Leyden Mus. 20, 1898, p. 47; Darlington, Psyche 34, 1927, p. 96.

Grenada (and Trinidad): described from the former (Mount Gay Estate, leeward side). In addition to a specimen from Grenada received from the U. S. N. M., I have a good series from St. Augustine, Trinidad, April, 1929, taken by myself.

19. *Helmis danforthi* (Musgrave)

L. c., p. 33 (Cyllœpus)

Puerto Rico: described from Rio Cañas, Las Marias; there are 2 paratypes in the M. C. Z., received from Mr. Musgrave.

20. **Helmis haitiana** n. sp. (Pl. III, fig. 8)

Form average, parallel; dull black, lower surface and appendages brown, antennæ paler basally; pubescence very inconspicuous. *Head* dull, granular. *Prothorax* subquadrate, moderately narrowed in front, scarcely so behind, 1/5 or 1/6 wider than long; sides broadly and more or less evenly arcuate, margins faintly crenate; disk convex, with entire sinuate carinæ nearly paralleling sides, these carinæ well defined inwardly, not defined (continuous with disk) externally; median longitudinal groove obsolete anteriorly, faint at middle, defined by a pair of faint carinæ at base; surface of disk dull but not distinctly granular, finely and not very closely punctate. *Elytra* ¼ or 1/5 wider than prothorax; sides nearly parallel basally, broadly rounded near apex; apices not produced; each elytron with 2 moderate costæ externally, evanescent on declivity; 4th interval faintly raised on disk, with a row of minute shining granules each side; 3rd interval faintly more prominent at base than 2nd or 4th; 4 discal striæ fine but distinct, indistinctly punctate; surface of disk dull but without distinct granules except on 4th interval and less distinctly on costæ (rarely a few on base of 3rd interval). Lower surface with scattered granules less obvious than usual; prosternal process about ½ width of mesosternum between middle coxæ; prosternum carinate before front coxæ; abdomen nearly uniformly granular-alutaceous, not obviously silky; 1st ventral not longitudinally carinate behind coxæ. Length 2 1/6–2 2/5; width 1 mm.

Haiti: holotype (M. C. Z. no. 21,793) and 17 paratypes (1 in U. S. N. M.) from the northeastern foothills of the Massif de la Hotte, southwestern peninsula, 2–4,000 ft., Oct. 10–24, 1934.

Differs from *danforthi* not only in larger size, but in less granulate, more distinctly punctate pronotum, less distinctly sulcate at middle, and usually in lacking distinct shining granules on base of elytra inside 3rd stria [in *danforthi* there are such granules in increasing numbers on the bases of the 1st (few), 2nd, and (much more conspicuous) 3rd intervals.]

21. *Helmis quadrata* Darl.

Psyche 34, 1927, p. 95.

Cuba: described from Soledad, near Cienfuegos, where it was retaken in August, 1934.

22. **Helmis lahottensis** n. sp. (Pl. III, fig. 9)

Form about average, subparallel, but distinctly more gibbous than usual; dull black, appendages (except tarsi and bases of antennæ) not much paler; pubescence inconspicuous. *Head* dull, granular. *Prothorax* moderately narrowed anteriorly, slightly posteriorly, 1/5 or 1/6 wider than long; sides *either* evenly and slightly arcuate *or* subangulate at basal 2/5, slightly or not sinuate before basal angles; margins crenate; disk convex, with strong, entire carinæ paralleling side margins, said carinæ defined both inwardly and (less distinctly) externally; median sulcus obsolete anteriorily, very deep at middle, sides of sulcus elevated and continued to base where fused to form single strong carina impressed along crest; surface of disk dull, finely granular, not distinctly punctate. *Elytra* about ¼ wider than prothorax; sides slightly arcuate anteriorly, more posteriorly; apices not produced; each elytron with 2 moderate carinæ externally, evanescent on declivity; 3rd interval prominent basally; 4 discal striæ slightly impressed, finely and not closely punctate; intervals slightly irregular; some inconspicuous shining granules at base especially on 3rd and 4th intervals. Lower surface with small scattered granules; prosternum not distinctly carinate before coxæ; prosternal process about ½ width mesosternum between middle coxæ; abdomen evenly granular-alutaceous, not distinctly silky, basal segment not carinate behind coxæ. Length 2¼ (more or less); width 1 mm.

Haiti: holotype (M. C. Z. no. 21,794) and 10 paratypes

(1 in U. S. N. M.) from the northeastern foothills of the Massif de la Hotte, 2–4,000 ft., Oct. 10–24, 1934. Like all the other West Indian Helmis I have taken, this is found in stony and especially gravelly places in swiftly running brooks and rivers.

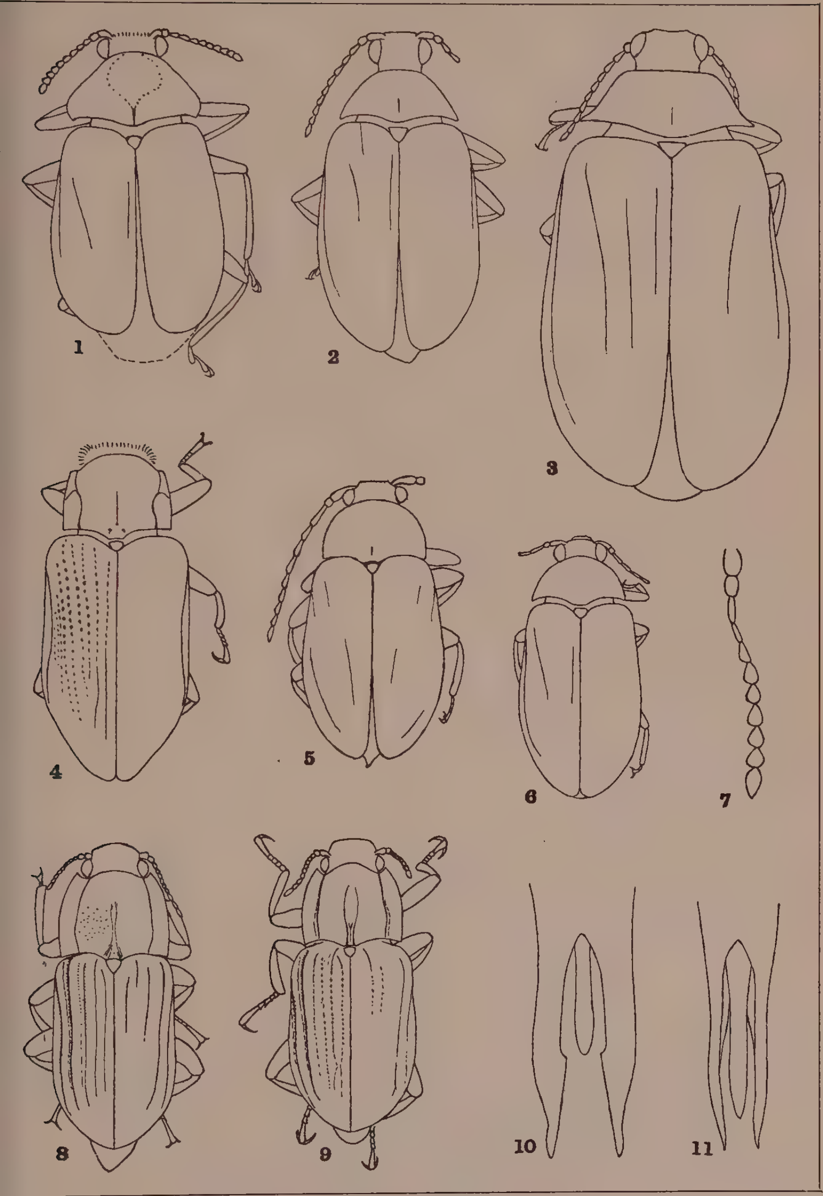
Differs from *quadrata* and its allies in being black, with coarser sculpture and differently carinate base of pronotum.

EXPLANATION OF PLATE III

(All figures from camera-lucida outlines)

1. *Psephenops maculicollis* n. sp. (♂, holotype) × about 17.
2. *Psephenops haitianus* n. sp. (♂, holotype) × about 17.
3. *Psephenops haitianus* (♀, allotype) × about 17.
4. *Phanocerus helmoides* n. sp. (♀, paratype) × about 17.
5. *Pheneps gracilis* n. gen. & sp. (♂, paratype) × about 9.
6. *Pheneps cubanus* n. sp. (♀, holotype) × about 9.
7. *Throscinus æthiops* n. sp. (antenna of paratype).
8. *Helmis haitiana* n. sp. (paratype) × about 17.
9. *Helmis lahottensis* n. sp. (paratype) × about 17.
10. *Pelonomus obscurus gracilipes* Chev. (genitalia of ♂ from Soledad, near Cienfugos, Cuba).
11. *Pelonomus picipes* (Oliv.) (genitalia of ♂ from Gourbeyre, Guadeloupe).

Psyche, 1936 VOL. 43, PLATE III.



Darlington — West Indian Dryopidæ.

PERILAMPUS, A SECONDARY PARASITE ON SARCOPHAGIDS AND TACHINIDS PARASITIC ON KATYDIDS AND LONG-HORNED GRASSHOPPERS

Ford[1] reports finding a planidium of Perilampus attached to a long-horned grasshopper, *Conocephalus fasciatus*. She considers it quite improbable that Conocephalus is the true host of the Perilampus, and that quite likely the planidium is a secondary parasite of some parasite of Conocephalus, because Perilampus has been reared as a secondary parasite from several species of Sarcophagids, though not from Sarcophagids on long-horned grasshoppers.[2, 3]

I have reared a Perilampus n. sp.[4] from one of three puparia collected from the cell of the digger wasp, *Ammobia pennsylvanica* which uses katydids, *Microcentrum rhombifolium* (*M. laurifolium*) for provisioning her cells. The other two puparia yielded a Brachymeria n. sp., and a Sarcophagid fly. The fly was in too poor a condition to allow of identification beyond Sarcophagidæ. The puparia, which were all identical, in structure, were new and as yet unidentified, making it impossible to use them as a means of identifying the fly. The find at least establishes the fact that Perilampus is a secondary parasite on a Sarcophagid parasitic on katydids.

From a collection of over fifty puparia of the Tachinid, *Senotainia trilineata* (V. d. W.) found in the cells of the same digger wasp, I reared 2 specimen of *Perilampus hyalinus* (Say). This establishes the fact that Perilampus is a secondary parasite on *Senotainia trilineata* parasitic on katydids. I have also reared, however, *S. trilineata* from

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1. N. Ford, Canad. Ent., 54:199-204, 1922.
2. H. S. Smith, U S Dept Agr, Bur Ent, Tech Ser 19 (4):33-69, 1912.
3. E. O. G. Kelly, Jour. Agric. Res., U. S. Dept. Agr., 2:435-445, 1914.
4. Identifications were made by the staff of the Bur. Ent. and Plant Quar., U. S. Dept. Agr. as follows: Orthoptera, A. N. Caudell; Perilamphus, A. B. Gahan; Sarcophagids, J. M. Aldrich and C. T. Greene.

puparia found in the cells of the digger wasp *Ammobia ichneumonea* which provisions her nest with long-horned grasshoppers of the species *Neoconocephalus ensiger* (*Conocephalus ensiger*) and *Conocephalus attenuatum* (*Xiphidium attenuatum*). This confirms the opinion of Ford that the planidium found in *Conocephalus fasciatus* is a secondary parasite of a Tachinid parasitic on long-horned grasshoppers, in this case *Senotainia trilineata*.

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